Supporting Information

Enantioselective Synthesis of Planar-Chiral Benzosiloloferrocenes by Rh-Catalyzed Intramolecular C-H Silylation

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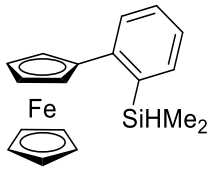
1) Experimental details and characterization data for new compounds

General information: ^{1}H NMR spectra were recorded on JEOL AL-500 (500 MHz) spectrometers. The chemical shifts were reported in parts per million (δ) relative to internal standard TMS (0 ppm) for $CDCl_3$. The peak patterns are indicated as follows: s, singlet; d, doublet; dd, doublet of doublet; t, triplet; m, multiplet; q, quartet. The coupling constants, J, are reported in Hertz (Hz). ^{13}C NMR spectra were obtained by JEOL AL-400 (125 MHz) spectrometers and referenced to the internal solvent signals (central peak is 77.0 ppm in $CDCl_3$). $CDCl_3$ was used as a NMR solvent. High-resolution mass spectra (HRMS) were measured on a JMS-T100CS with ESI (Electro Spray Ionization) method. Optical rotations were measured on a JASCO DIP-1000 polarimeter. Preparative thin-layer chromatography (PTLC) was performed with silica gel-precoated glass plates (Merck 60 GF_{254}) prepared in our laboratory, Flash column chromatography was performed over silica gel 200-300. All reagents were weighed and handled in air and backfilled under Argon at room temperature. Unless otherwise noted, all reactions were performed under an argon atmosphere. All reagents were purchased from Wako, Kanto, Aldrich and TCI and used without further purification.

Typical experimental procedure for synthesis of 2-ferrocenyl-1-bromobenzene (Scheme 2): Water (55 ml), concentrated hydrochloric acid (8 ml) and 2-bromoaniline (0.58ml, 909 mg, 5.3 mmol) were added in a two necked flask, then a sodium nitrite solution in water (440 mg/ml, 8 ml, 6.36 mmol) was added dropwise by maintaining below -5 °C. After 1 h, this mixed solution was warmed to room temperature, and was added sulfamic acid (779 mg, 6.5 mmol). A solution of ferrocene (1 g, 5.3 mmol) and NaOAc (800 mg, 9.75 mmol) in dichloromethane (60 ml) was added the above mixture. The solution was stirred for 12 h at room temperature. After the reaction was complete, the mixture was extracted with dichloromethane and washed by brine, water, and $NaHCO_3$ aq. The organic layer was dried over Na_2SO_4, filtered, and concentrated under reduced pressure. The product was isolated by column chromatography on silica gel (hexane only) to give 2-ferrocenyl-1-bromobenzene (795 mg, 2.3 mmol, 44 %).

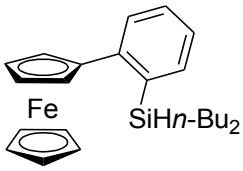
Typical experimental procedure for the synthesis of 2-ferrocenyl-1-(dimethylhydrosilyl)benzene (1aa) (Scheme 2): a solution of 2-ferrocenyl-1-bromobenzene (341 mg, 1 mmol) in THF (6 ml) was cooled to -78 °C, and n-BuLi (1.60 M in hexane, 1.9 ml, 3 mmol) was added dropwise under an atmosphere of argon. After 15 min, dimethylhydrochrolosilane (0.68 ml, 4 mmol) was added dropwise at -78 °C and mixture was warmed to room temperature slowly. After 12 h, a saturated solution of NH_4Cl in water was added and mixture extracted dichloromethane. The organic layer was dried over Na_2SO_4, filtered, and concentrated under reduced pressure. The product was isolated by column chromatography on silica gel (hexane only) to give 2-ferrocenyl-1-(dimethylhydrosilyl)benzene (**1aa**) (256 mg, 0.8 mmol, 80 %yield).

Typical experimental procedure for enantioselective intramolecular silylation of 1aa: $[Rh(coe)_2Cl]_2$ (3.6 mg, 0.005 mmol), chiral diene ligand (2.9 mg, 0.012 mmol), ferrocene **1aa** (16.0 mg, 0.05 mmol) and 3,3-dimethylbut-1-ene (64.6 μl, 0.5 mmol) were dissolved in toluene 0.5 ml. The resulting mixture was stirred at 135 °C. The progress of the reaction was monitored by TLC. After the reaction was complete, it was filtered through a short plug of silica gel with ethyl acetate and the filtrate was evaporated under reduced pressure. The crude products were purified by thin-layer chromatography (hexane) to give the mixture of **2aa** and **3aa**, whose ratio was determined by ^{1}H-NMR analysis. Compound **2aa** was separated from **3aa** by GPC (gel permeation chromatography) and was fully characterized.



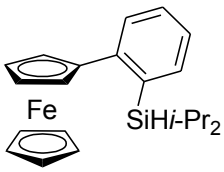
1-(Dimethylhydrosilyl)-2-ferrocenylbenzene (1aa).

Isolated by column chromatography (hexane only, Rf = 0.5). The title compound was obtained as orange solid (80%). Mp 89 ℃, ^{1}H NMR δ 7.90 (dd, *J* = 0.9, 3.8 Hz, 1H), 7.47 (dd, *J* = 0.9, 3.8 Hz, 1H), 7.39 (ddd, *J* = 1.3, 7.5, 8.2 Hz, 1H), 7.24 (ddd, *J* = 1.3, 7.5, 8.2 Hz, 1H, overlap with $CHCl_3$), 4.44-4.55 (m, 3H), 4.27 (t, *J* = 1.8 Hz, 2H), 4.17 (s, 5H), 0.10 (d, *J* = 3.7 Hz, 6H); ^{13}C NMR δ 145.0, 136.6, 134.6, 131.1, 128.9, 125.7, 91.4, 70.5, 69.4, 67.7, -3.0. IR (CH_2Cl_2 cast film): 2359, 1749, 1216, 882, 417 cm^{-1}. HRMS(ESI) calcd for $C_{18}H_{20}FeSi$ (M^+): 320.0678; found: 320.0678.



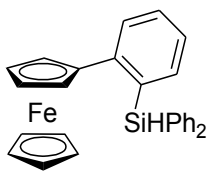
1-(Dibutylhydrosilyl)-2-ferrocenylbenzene (1ab).

Isolated by column chromatography (hexane only, Rf = 0.4). The title compound was obtained as orange oil (95%). ^{1}H NMR δ 7.90 (dd, *J* = 1.1, 3.8 Hz, 1H), 7.44 (dd, *J* = 1.1, 3.8 Hz, 1H), 7.38 (ddd, *J* = 1.3, 7.5, 8.2 Hz, 1H), 7.22 (ddd, *J* = 1.3, 7.5, 8.2 Hz, 1H), 4.44 (t, *J* = 1.8 Hz, 2H), 4.21-4.27 (m, 3H), 4.17 (s, 5H), 1.15-1.29 (m, 8H), 0.81 (t, *J* = 7.0 Hz, 6H), 0.54-0.67 (m, 4H); ^{13}C NMR δ 145.1, 135.4, 135.4, 131.2, 128.7, 125.9, 91.9, 70.8, 69.6, 67.8, 27.0, 26.2, 13.7, 12.1. IR (CH_2Cl_2 cast film): 2922, 2102, 1420, 816, 486 cm^{-1}. HRMS(ESI) calcd for $C_{24}H_{32}FeSi$ (M^+): 404.1617; found: 404.1619.



1-(Diisopropylhydrosilyl)-2-ferrocenylbenzene (1ac).

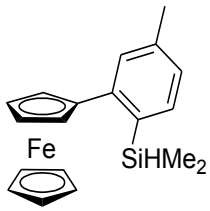
Isolated by column chromatography (hexane only, Rf = 0.5). The title compound was obtained as orange oil (80%). ^{1}H NMR δ 7.92 (d, *J* = 7.16 Hz, 1H), 7.41 (dd, *J* = 7.37, 1.0 Hz, 1H), 7.36 (ddd, *J* = 7.60, 7.60, 1.5 Hz, 1H), 7.21 (ddd, *J* = 7.44, 7.44, 1.2 Hz, 1H), 4.42 (t, *J* = 1.77 Hz, 2H), 4.24 (t, *J* = 1.77 Hz, 2H), 4.16 (s, 5H), 3.88 (t, *J* = 3.6 Hz, 1H), 1.02-1.07 (m, 2H), 0.97 (d, *J* = 7.0 Hz, 6H), 0.87 (d, *J* = 7.0 Hz, 6H); ^{13}C NMR δ 145.3, 135.8, 134.5, 131.4, 128.5, 125.3, 91.7, 71.0, 69.4, 67.5, 19.3, 19.1, 11.7. IR (CH_2Cl_2 cast film): 3095, 2938, 2861, 2359, 2137, 1460, 1420, 1002, 817; HRMS(ESI) calcd for $C_{22}H_{28}FeSi$ (M^+): 376.1304; found: 376.1304.



1-(Diphenylhydrosilyl)-2-ferrocenylbenzene (1ad).

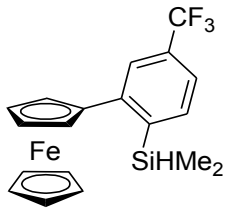
Isolated by column chromatography (hexane only, Rf = 0.3). The title compound was obtained as orange solid (88%). Mp 126 ℃, ^{1}H NMR δ 7.94 (d, *J* = 7.2 Hz, 1H), 7.39-7.46 (m, 5H), 7.35-7.39 (m, 2H), 7.29-7.34 (m, 4H), 7.27 (dd, *J* = 1.1, 7.5 Hz, 1H), 7.16 (ddd, *J* = 1.1, 4.0, 7.5 Hz, 1H), 5.37 (s, 1H), 4.36 (t, *J* = 1.8 Hz, 2H), 4.11 (t, *J* = 1.8 Hz, 2H), 4.08 (s, 5H); ^{13}C NMR δ 146.3, 137.0, 135.8, 134.5, 132.0, 130.9,

129.4, 127.9, 125.5, 90.2, 70.5, 69.4, 67.8(A pair of peaks at the aromatic rings was overlapped.). IR (CH_2Cl_2 cast film): 2922, 1770, 1375, 888, 648 cm^{-1}. HRMS(ESI) calcd for $C_{28}H_{24}FeSi$ (M^+): 444.0991; found: 444.0991.



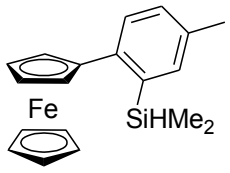
1-(Dimethylhydrosilyl)-2-ferrocenyl-4-methylbenzene (1ba).

Isolated by column chromatography (hexane only, Rf = 0.5). The title compound was obtained as orange oil (85%). ^1H NMR δ 7.72 (s, 1H), 7.36 (d, J = 7.5 Hz, 1H), 7.07 (d, J = 7.5 Hz, 1H), 4.37-4.55 (m, 3H), 4.26 (s, 2H), 4.17 (s, 5H), 2.43 (s, 3H), 0.08 (s, 6H); ^{13}C NMR δ 145.0, 138.6, 134.8, 133.1, 131.9, 126.7, 91.6, 70.5, 69.5, 67.7, 21.5, -2.9. IR (CH_2Cl_2 cast film): 2923, 2359, 1770, 1507, 1245 cm^{-1}. HRMS(ESI) calcd for $C_{19}H_{22}FeSi$ (M^+): 334.0835; found: 334.0834.



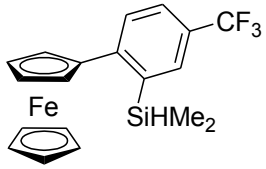
1-(Dimethylhydrosilyl)-2-ferrocenyl-4-(trifluoromethyl)benzene (1ca).

Isolated by column chromatography (hexane only, Rf = 0.5). The title compound was obtained as orange oil (79%). ^1H NMR δ 8.17 (s, 1H), 7.55 (d, J = 7.7 Hz, 1H), 7.45 (d, J = 7.7 Hz, 1H), 4.42-4.57 (m, 3H), 4.30 (s, 2H), 4.17 (s, 5H), 0.12 (d, J = 3.7 Hz, 6H); ^{13}C NMR δ 146.2, 141.3, 135.0, 130.8 (q, $J_{C\text{-}F}$ = 31.9 Hz, 1C), 127.6 (q, $J_{C\text{-}F}$ = 3.6 Hz, 1C), 124.3 (q, $J_{C\text{-}F}$ = 271.5 Hz, 1C), 121.9 (q, $J_{C\text{-}F}$ = 3.6 Hz, 1C), 90.2, 70.6, 69.6, 68.2, -3.3. IR (CH_2Cl_2 cast film): 2957, 2128, 1330, 1127, 880 cm^{-1}. HRMS(ESI) calcd for $C_{19}H_{19}F_3FeSi$ (M^+): 388.0552; found: 388.0552.



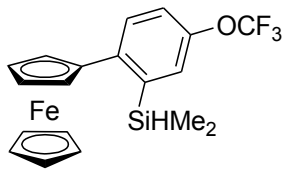
1-(Dimethylhydrosilyl)-2-ferrocenyl-5-methylbenzene (1da).

Isolated by column chromatography (hexane only, Rf = 0.5). The title compound was obtained as orange solid (66%). Mp 64 ℃, ^1H NMR δ 7.80 (d, J = 7.9 Hz, 1H), 7.26 (s, 1H), 7.21 (d, J = 7.9 Hz, 1H), 4.43-4.46 (m, 3H), 4.24 (t, 2H), 4.16 (s, 5H), 2.36 (s, 3H), 0.09 (d, J = 3.7 Hz, 6H); ^{13}C NMR δ 141.9, 136.5, 135.3, 135.1, 131.1, 129.7, 91.4, 70.5, 69.4, 67.6, 21.1, -3.0. IR (CH_2Cl_2 cast film): 2994, 2954, 2115, 1758, 1246, 896; HRMS(ESI) calcd for $C_{19}H_{22}FeSi$ (M^+): 334.0835; found: 334.0834.



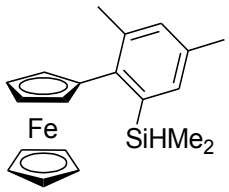
1-(Dimethylhydrosilyl)-2-ferrocenyl-5-(trifluoromethyl)benzene (1ea).

Isolated by column chromatography (hexane only, Rf = 0.5). The title compound was obtained as orange solid (89%). Mp 93 ℃, ^{1}H NMR δ 7.98 (d, J = 8.2 Hz, 1H), 7.66 (s, 1H), 7.61 (d, J = 8.2 Hz, 1H), 4.50-4.53 (m, 3H), 4.32-4.33 (m, 2H), 4.17 (s, 5H), 0.14 (d, J = 8.2 Hz, 6H); ^{13}C NMR δ 149.4 (q, $J_{C\text{-}F}$ = 1.79 Hz, 1C), 137.6, 131.2 (q, $J_{C\text{-}F}$ = 3.28 Hz, 1C), 127.6 (q, $J_{C\text{-}F}$ = 31.6 Hz, 1C), 125.5 (q, $J_{C\text{-}F}$ = 3.6 Hz, 1C), 124.5 (q, $J_{C\text{-}F}$ = 271.8 Hz, 1C), 89.8, 70.6, 69.7, 68.3, -3.2. IR (CH_2Cl_2 cast film): 3095, 2959, 2129, 1770, 1324, 1248, 1123, 1078, 889; HRMS(ESI) calcd for $C_{19}H_{19}F_3FeSi$ (M^+): 388.0552; found: 388.0552.



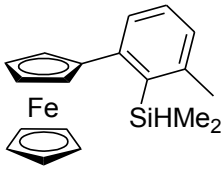
1-(Dimethylhydrosilyl)-2-ferrocenyl-5-(trifluoromethoxy)benzene (1fa).

Isolated by column chromatography (hexane only, Rf = 0.5). The title compound was obtained as orange oil (60%). ^{1}H NMR δ 7.91 (d, J = 8.5 Hz, 1H), 7.24 (s, 1H), 7.21 (d, J = 8.5 Hz, 1H), 4.45-4.48 (m, 3H), 4.28 (t, J = 1.8 Hz, 2H), 4.17 (s, 5H), 0.11 (s, 3H), 0.10 (s, 3H); ^{13}C NMR δ 147.3, 143.9, 139.2, 132.5, 126.6, 121.1, 120.6 (d, $J_{C\text{-}F}$ = 257.1 Hz, 1C), 90.1, 70.5, 69.5, 68.0. IR (CH_2Cl_2 cast film): 3095, 2959, 2195, 1770, 1251, 1223, 886; HRMS(ESI) calcd for $C_{19}H_{19}OF_3FeSi$ (M^+): 404.0501; found: 404.0503.



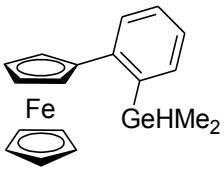
3,5-Dimethyl-1-(dimethylhydrosilyl)-2-ferrocenylbenzene (1ga).

Isolated by column chromatography (hexane only, Rf = 0.4). The title compound was obtained as orange solid (82%). Mp 88 ℃, ^{1}H NMR δ 7.17 (s, 1H), 7.08 (s, 1H), 4.37-4.55 (m, 3H), 4.34 (s, 2H), 4.16 (s, 5H), 2.89 (s, 3H), 2.31 (s, 3H), 0.04 (d, J = 3.7 Hz, 6H); ^{13}C NMR δ 139.2, 139.1, 136.4, 135.1, 134.2, 133.1, 90.6, 70.9, 69.3, 67.5, 21.4, 20.9, -2.0. IR (CH_2Cl_2 cast film): 2951, 2116, 1248, 881, 489 cm^{-1}. HRMS(ESI) calcd for $C_{20}H_{24}FeSi$ (M^+): 348.0991; found: 348.0991.



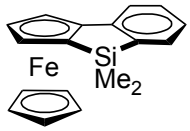
1-(Dimethylhydrosilyl)-2-ferrocenyl-6-methylbenzene (1ha).

Isolated by column chromatography (hexane only, Rf = 0.4). The title compound was obtained as orange oil (57%). ^{1}H NMR δ 7.80 (d, J = 7.5 Hz, 1H), 7.27 (t, J = 7.5 Hz, 1H), 7.07 (d, J = 7.5 Hz, 1H), 4.39 (t, J = 1.8 Hz, 2H), 4.21-4.29 (m, 3H), 4.16 (s, 5H), 2.48 (s, 3H), 0.14 (d, J = 4.0 Hz, 6H); ^{13}C NMR δ 145.4, 143.9, 136.3, 129.6, 128.3, 128.1, 93.7, 71.1, 69.4, 67.4, 23.5, -1.9. IR (CH_2Cl_2 cast film): 2360, 2125, 1770, 1246, 883 cm^{-1}. HRMS(ESI) calcd for $C_{19}H_{22}FeSi$ (M^+): 334.0835; found: 334.0834.

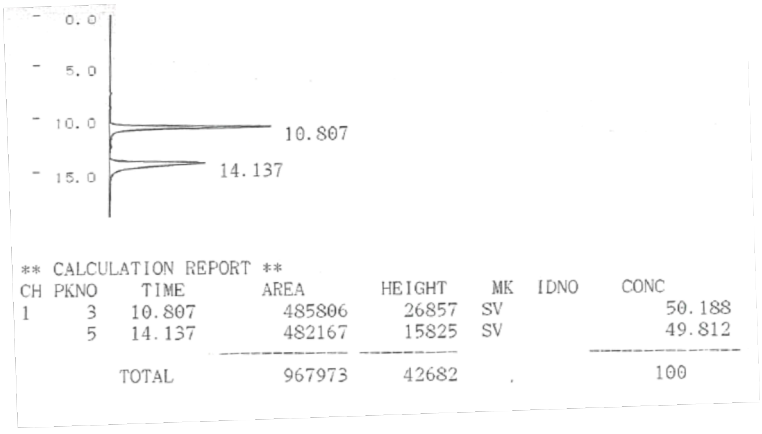


1-(Dimethylhydrogermyl)-2-ferrocenylbanzene(4).

Isolated by column chromatography (hexane only, Rf = 0.4). The title compound was obtained as orange oil (10%). ^{1}H NMR δ 7.89 (d, *J* = 7.6 Hz, 1H), 7.31-7.44 (m, 2H), 7.18-7.26 (m, 1H, overlap with $CHCl_3$), 4.47-4.53 (m, 1H), 4.46 (t, *J* = 1.8 Hz, 2H), 4.26 (t, *J* = 1.8 Hz, 2H), 4.17 (s, 5H), 0.23 (d, *J* = 3.4 Hz, 6H); ^{13}C NMR δ 144.4, 139.1, 134.0, 131.0, 128.3, 125.9, 91.5, 70.4, 69.4, 67.7, -3.1. IR (CH_2Cl_2 cast film): 2923, 2855, 2358, 1456, 1246 cm^{-1}. HRMS(ESI) calcd for $C_{18}H_{20}FeGe$ (M^+): 362.0153; found: 362.0151.



(*S*)-8,8-Dimethylbenzosilolo[2,3-a]ferrocene (2aa). Isolated by thin-layer chromatography (hexane only, Rf = 0.4) and purified by gel permeation chromatography (GPC). The title compound was obtained as orange solid (81%). Mp 64 ℃, ^{1}H NMR δ 7.42 (d, *J* = 7.2 Hz, 1H), 7.34 (d, *J* = 7.5 Hz, 1H), 7.26 (t, *J* = 7.5 Hz, 1H, overlap with $CHCl_3$), 7.12 (t, *J* = 7.2 Hz, 1H), 4.74-4.80 (m, 1H), 4.49-4.55 (m, 1H), 4.32-4.38 (m, 1H), 3.98 (s, 5H), 0.67 (s, 3H), 0.31 (s, 3H); ^{13}C NMR δ 147.8, 142.1, 132.4, 129.5, 125.2, 120.9, 97.0, 73.2, 71.7, 70.5, 69.7, 64.0, -0.8, -1.6. IR (CH_2Cl_2 cast film): 2924, 2361, 1742, 1363, 1216 cm^{-1}. HRMS(ESI) calcd for $C_{18}H_{18}FeSi$ (M^+): 318.0522; found: 318.0521. $[\alpha]^{17}_D$ = -339 (c 0.79, $CHCl_3$, 85% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IA-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 14.0 min for major isomer and 10.8 min for minor isomer). The crystal data of compound **2aa**: $C_{18}H_{18}FeSi$, *M* = 318.27, orthorhombic, space group $P2_12_12_1$ (no. 19), *a* = 9.6741(4) Å, *b* = 10.9465(6) Å, *c* = 29.0292(11) Å, *V* = 3074.1(2) Å^3, *Z* = 8, μ(Mo-Kα) = 10.447 cm^{-1}; number of reflections measured: total 29429 and unique 6966, R1 = 0.0371, *w*R2 = 0.1036, Flack parameter (Friedel pairs = 2036) 0.003(8). CCDC 1045375.



** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
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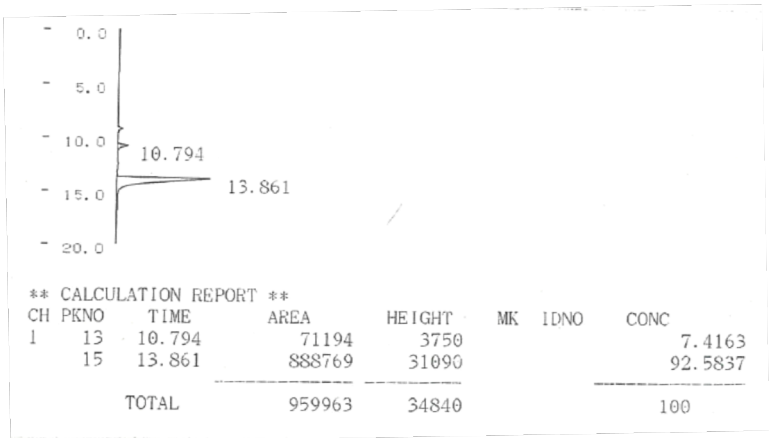
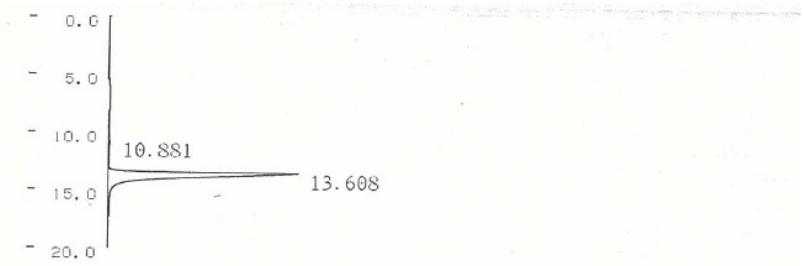
	5	14.137	482167	15825	SV		49.812
		TOTAL	967973	42682			100



** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	13	10.794	71194	3750			7.4163
	15	13.861	888769	31090			92.5837
		TOTAL	959963	34840			100

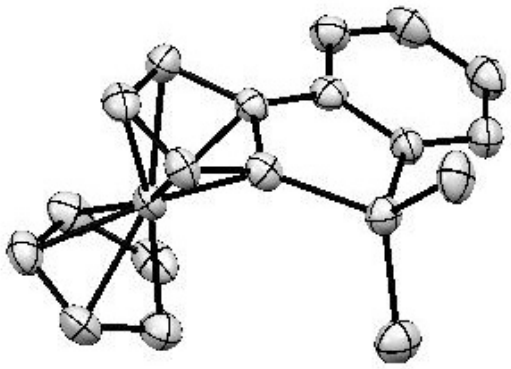
HPLC chart of **3aa** after recrystallization

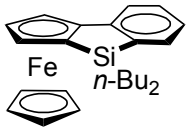


** CALCULATION REPORT **

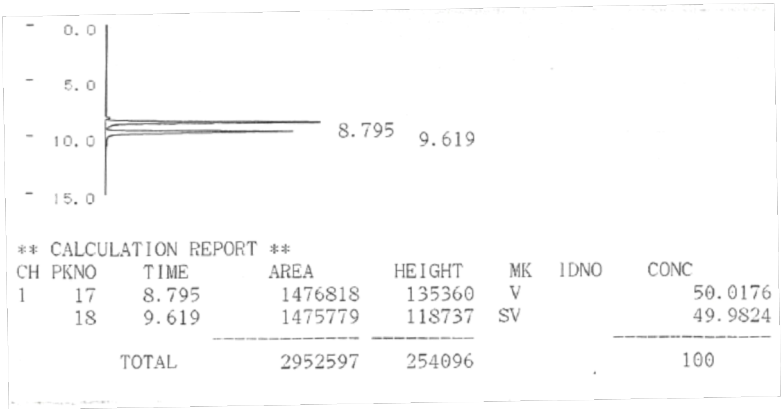
CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	2	10.881	1943	104	SV		0.4162
	8	13.608	464806	14814	S		99.5838
		TOTAL	466749	14918			100

ORTEP diagram of (*S*)-**2aa**



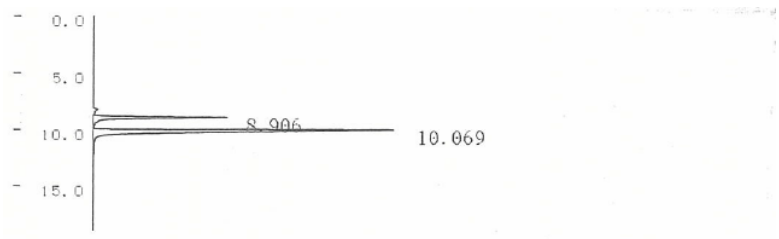


8,8-Dibutylbenzosilolo[2,3-a]ferrocene (2ab).
Isolated by thin-layer chromatography (hexane only, Rf = 0.3). The title compound was obtained as orange oil (51%). ^{1}H NMR δ 7.41 (d, *J* = 7.0 Hz, 1H), 7.34 (d, *J* = 7.6 Hz, 1H), 7.23-7.28 (m, 1H), 7.10 (ddd, *J* = 0.9, 7.3, 8.4 Hz, 1H), 4.77 (d, *J* = 2.2 Hz, 1H), 4.51 (t, *J* = 2.2 Hz, 1H), 4.30 (d, *J* = 2.2 Hz, 1H), 3.97 (s, 5H), 1.62-1.76 (m, 2H), 1.46-1.61 (m, 2H, overlapped with H_2O), 1.07-1.23 (m, 6H), 1.02 (t, *J* = 7.3 Hz, 3H), 0.70-0.83 (m, 5H); ^{13}C NMR δ 148.2, 141.0, 133.1, 129.4, 125.0, 121.0, 97.1, 73.1, 71.2, 70.1, 69.6, 63.9, 26.7, 26.6, 26.3, 26.2, 14.0, 13.7, 13.5, 13.4. IR (CH_2Cl_2 cast film): 2923, 2855, 2358, 1456, 1246 cm^{-1}. HRMS(ESI) calcd for $C_{24}H_{30}FeSi$ (M^+): 402.1461; found: 402.1461. $[\alpha]^{22}_D$ = -98 (c 0.51, $CHCl_3$, 50% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IA-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 9.8 min for major isomer and 8.9 min for minor isomer).



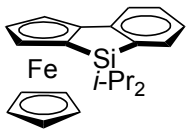
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	17	8.795	1476818	135360	V		50.0176
	18	9.619	1475779	118737	SV		49.9824
		TOTAL	2952597	254096			100

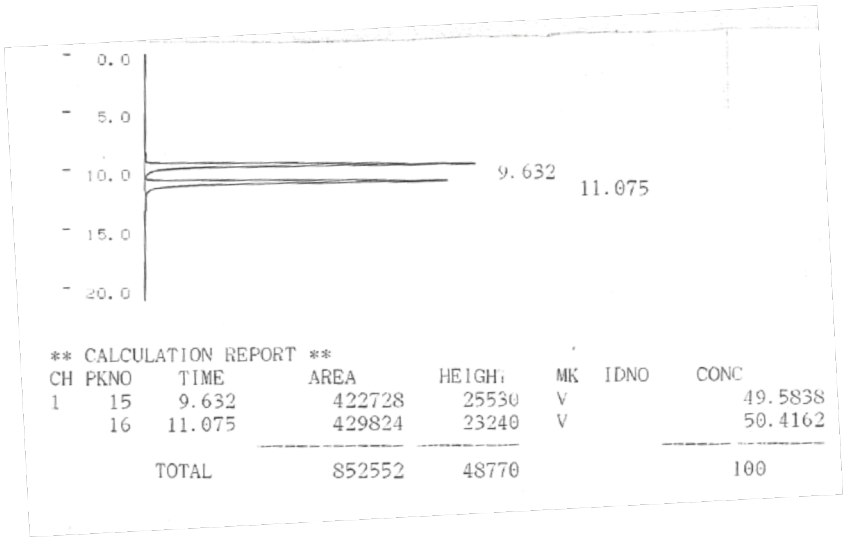


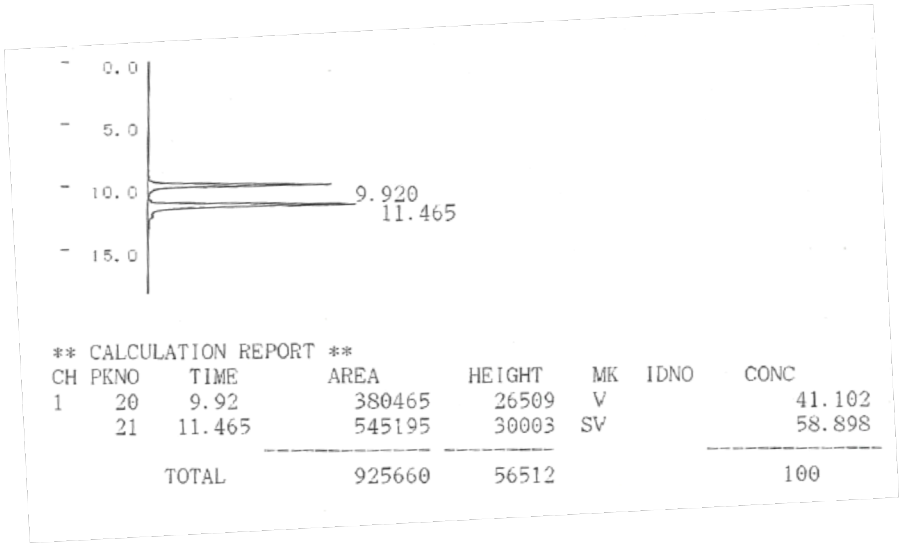
** CALCULATION REPORT **

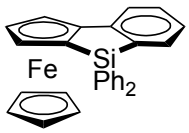
CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	23	8.906	493030	42501	V		25.0328
	24	10.069	1476503	96330	SV		74.9672
		TOTAL	1969533	138831			100



8,8-Diisopropylbenzosilolo[2,3-a]ferrocene (2ac).
Isolated by thin-layer chromatography (hexane only, Rf = 0.4). The title compound was obtained as orange oil (39%). ^{1}H NMR δ 7.42-7.49 (m, 1H), 7.31-7.38 (m, 1H), 7.23-7.31 (m, 1H, overlapped with $CHCl_3$), 7.07-7.13 (m, 1H), 4.78 (d, *J* = 2.2 Hz, 1H), 4.53 (t, *J* = 2.2 Hz, 1H), 4.29 (d, *J* = 2.2 Hz, 1H), 3.98 (s, 5H), 1.46-1.53 (m, 1H), 1.43 (t, *J* = 6.4 Hz, 6H), 1.18-1.24 (m, 1H), 0.91 (d, *J* = 7.3 Hz, 3H), 0.82 (d, *J* = 7.3 Hz, 3H); ^{13}C NMR δ 148.5, 139.9, 133.4, 129.3, 125.0, 121.1, 97.2, 73.1, 71.0, 70.5, 69.7, 63.7, 18.9, 18.8, 18.7, 18.4, 14.0, 11.3. IR (CH_2Cl_2 cast film): 2924, 2359, 1749, 1350, 1229 cm^{-1}. HRMS(ESI) calcd for $C_{22}H_{26}FeSi$ (M^+): 374.1148; found: 374.1148. $[\alpha]^{22}_D$ = -53 (c 0.38, $CHCl_3$, 18% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IA-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 11.3 min for major isomer and 9.8 min for minor isomer).

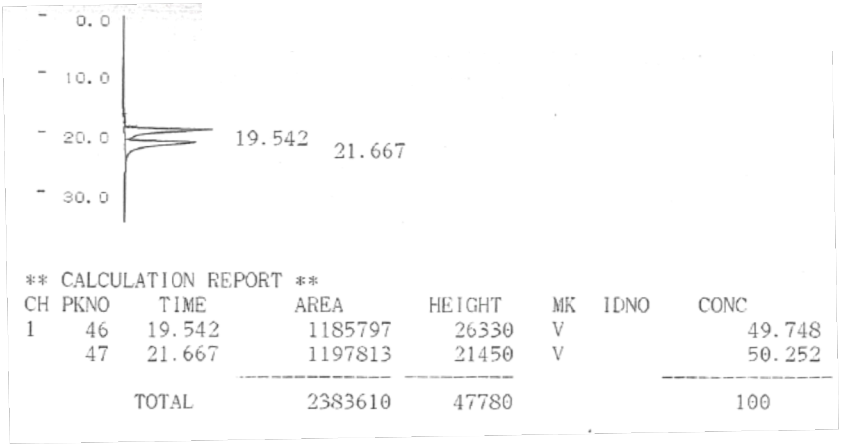






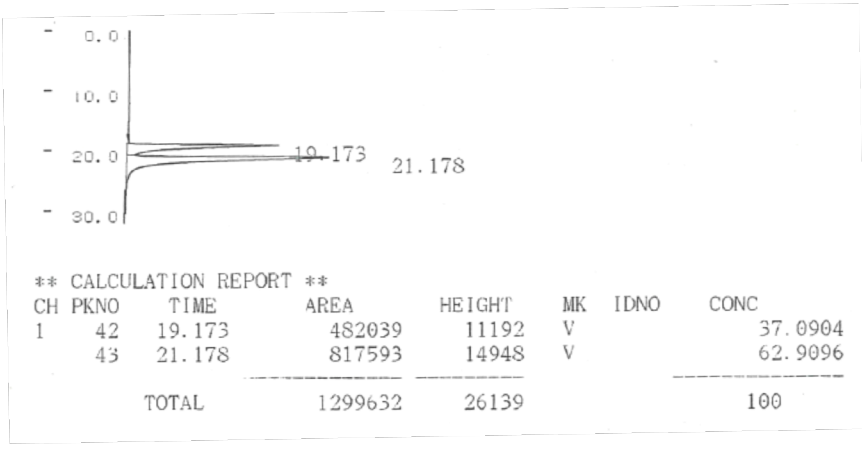
8,8-Diphenylbenzosilolo[2,3-a]ferrocene (2ad).

Isolated by thin-layer chromatography (hexane/EtOAc = 20/1, Rf = 0.5). The title compound was obtained as orange oil (74%). ^{1}H NMR δ 7.85-7.92 (m, 2H), 7.67 (d, *J* = 6.7 Hz, 1H), 7.47-7.52 (m, 4H), 7.46-7.47 (m, 1H), 7.41 (d, *J* = 7.6 Hz, 1H), 7.28-7.34 (m, 2H), 7.21-7.26 (m, 2H), 7.17-7.21 (m, 1H), 4.84 (d, *J* = 2.3 Hz, 1H), 4.60 (t, *J* = 2.3 Hz, 1H), 4.52 (d, *J* = 2.3 Hz, 1H), 3.65 (s, 5H); ^{13}C NMR δ 148.9, 138.1, 135.8, 135.3, 135.3, 135.1, 134.5, 134.1, 130.1, 129.9, 129.6, 129.4, 128.1, 127.9, 127.8, 125.6, 121.3, 97.3, 73.7, 70.8, 70.1, 69.1, 64.3. IR (CH_2Cl_2 cast film): 2924, 2359, 1739, 1364, 698 cm^{-1}. HRMS(ESI) calcd for $C_{28}H_{22}FeSi$ (M^+): 442.0835; found: 442.0835. $[\alpha]^{21}_D$ = -91 (c 0.82, $CHCl_3$, 26% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IA-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 20.3 min for major isomer and 18.0 min for minor isomer).



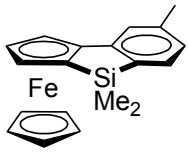
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	46	19.542	1185797	26330	V		49.748
	47	21.667	1197813	21450	V		50.252
		TOTAL	2383610	47780			100



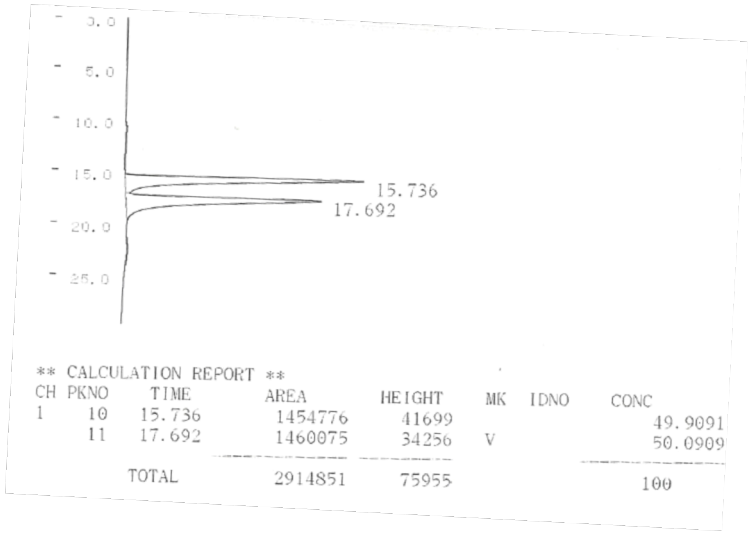
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	42	19.173	482039	11192	V		37.0904
	43	21.178	817593	14948	V		62.9096
		TOTAL	1299632	26139			100



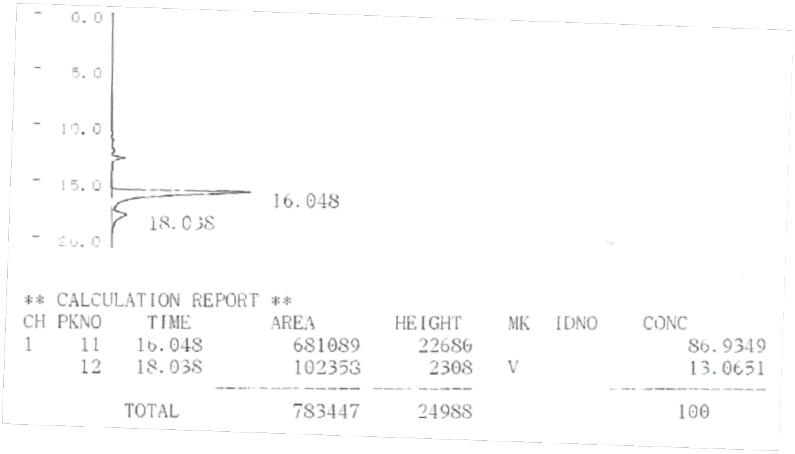
5,8,8-Trimethylbenzosilolo[2,3-a]ferrocene (2ba).

Isolated by thin-layer chromatography (hexane only, Rf = 0.4) and purified by gel permeation chromatography (GPC). The title compound was obtained as orange oil (56%). ^{1}H NMR δ 7.32 (d, *J* = 7.3 Hz, 1H), 7.17 (s, 1H), 6.95 (d, *J* = 7.3 Hz, 1H), 4.74 (d, *J* = 2.2 Hz, 1H), 4.50 (t, *J* = 2.2 Hz, 1H), 4.33 (d, *J* = 2.2 Hz, 1H), 3.98 (s, 5H), 2.35 (s, 3H), 0.65 (s, 3H), 0.29 (s, 3H); ^{13}C NMR δ 148.0, 139.3, 138.6, 132.3, 126.2, 121.8, 97.1, 73.0, 72.1, 70.4, 69.6, 63.9, 21.7, -0.7, -1.5. IR (CH_2Cl_2 cast film): 2922, 2321, 1244, 775, 418 cm^{-1}. HRMS(ESI) calcd for $C_{19}H_{20}FeSi$ (M^+): 332.0678; found: 332.0677. $[\alpha]^{18}_{D}$ = -104 (c 0.48, $CHCl_3$, 74% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IF-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 15.9 min for major isomer and 17.9 min for minor isomer).



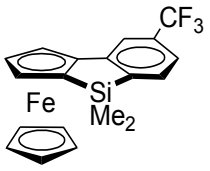
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	10	15.736	1454776	41699			49.9091
	11	17.692	1460075	34256	V		50.0909
		TOTAL	2914851	75955			100



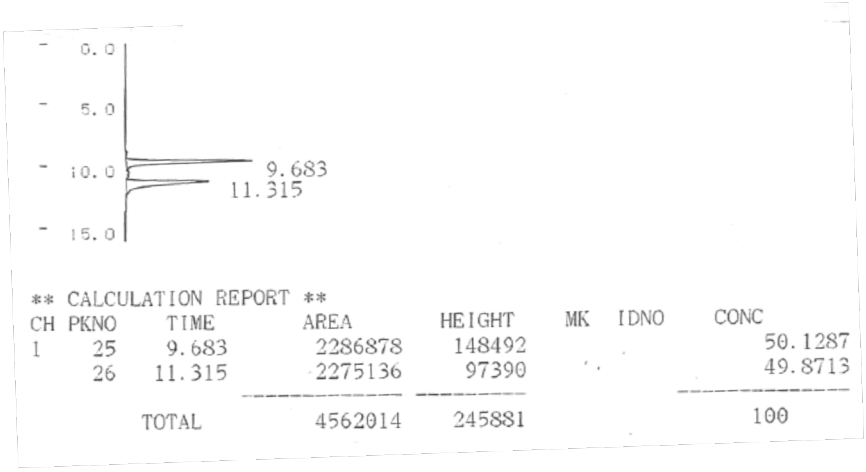
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	11	16.048	681089	22686			86.9349
	12	18.038	102358	2308	V		13.0651
		TOTAL	783447	24988			100



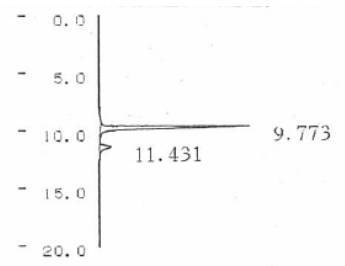
8,8-Dimethyl-5-(trifluoromethyl)benzosilolo[2,3-a]ferrocene (2ca).

Isolated by thin-layer chromatography (hexane only, Rf = 0.4) and purified by gel permeation chromatography (GPC). The title compound was obtained as orange oil (55%). ^{1}H NMR δ 7.46-7.53 (m, 2H), 7.35 (d, *J* = 7.5 Hz, 1H), 4.82 (d, *J* = 2.2 Hz, 1H), 4.58 (t, *J* = 2.2 Hz, 1H), 4.40 (d, *J* = 2.2 Hz, 1H), 3.99 (s, 5H), 0.69 (s, 3H), 0.33 (s, 3H); ^{13}C NMR δ 149.1, 146.8, 132.6, 131.7 (q, *J* = 31.8 Hz, 1C), 124.5 (q, *J* = 271.8 Hz, 1C), 121.7 (q, *J* = 3.7 Hz, 1C), 116.9 (q, *J* = 3.7 Hz, 1C), 95.4, 73.8, 71.8, 71.0, 69.8, 64.4, -0.9, -1.8. IR (CH_2Cl_2 cast film): 2952, 1420, 1248, 837, 727 cm^{-1}. HRMS(ESI) calcd for $C_{19}H_{17}F_3FeSi$ (M^+): 386.0396; found: 386.0396. $[\alpha]^{20}_D$ = -80 (c 0.20, $CHCl_3$, 78% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IA-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 9.7 min for major isomer and 11.4 min for minor isomer).



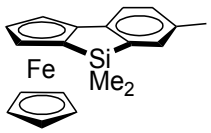
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	25	9.683	2286878	148492			50.1287
	26	11.315	2275136	97390			49.8713
		TOTAL	4562014	245881			100



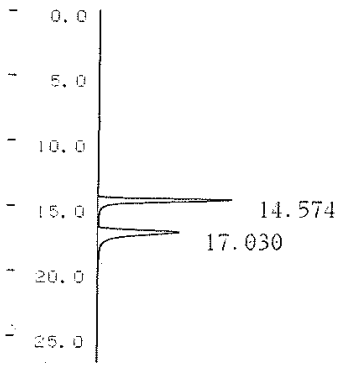
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	1	9.773	312623	23585			88.954
	3	11.431	38821	1811			11.046
		TOTAL	351444	25397			100



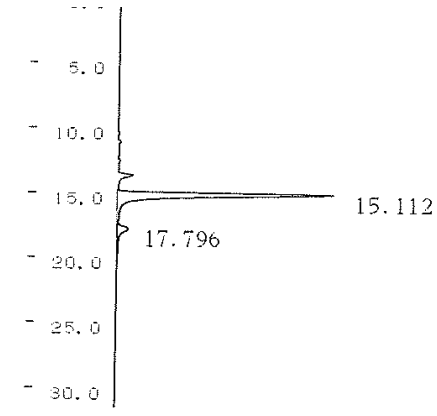
6,8,8-Trimethylbenzosilolo[2,3-a]ferrocene (2da).

Isolated by thin-layer chromatography (hexane only, Rf = 0.45) and purified by gel permeation chromatography (GPC). The title compound was obtained as orange oil (44%). ^{1}H NMR δ 7.23-7.24 (m, 2H), 7.06 (d, *J* = 7.7 Hz, 1H), 4.72 (d, *J* = 2.1 Hz, 1H), 4.88 (t, *J* = 2.3 Hz, 1H), 4.32 (d, *J* = 2.1 Hz, 1H), 3.97 (s, 5H), 2.31 (s, 3H), 0.66 (s, 3H), 0.30 (s, 3H); ^{13}C NMR δ144.7, 142.2, 134.6, 133.3, 130.3, 120.7, 72.9, 71.5, 70.3, 69.8, 69.6, 63.8, 21.3, -0.7, -1.6. IR (CH_2Cl_2 cast film): 2996, 2359, 1770, 1245, 1056; HRMS(ESI) calcd for $C_{19}H_{20}FeSi$ (M^+): 332.0678; found: 332.0678. $[\alpha]^{23}_D$ = -245 (c 0.32, $CHCl_3$, 86% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IF-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 15.1 min for major isomer and 17.8 min for minor isomer).



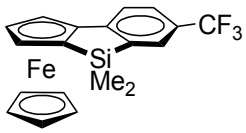
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	38	14.574	184037	9367	V		49.971
	39	17.03	184250	5718	SV		50.029
		TOTAL	368287	15085			100

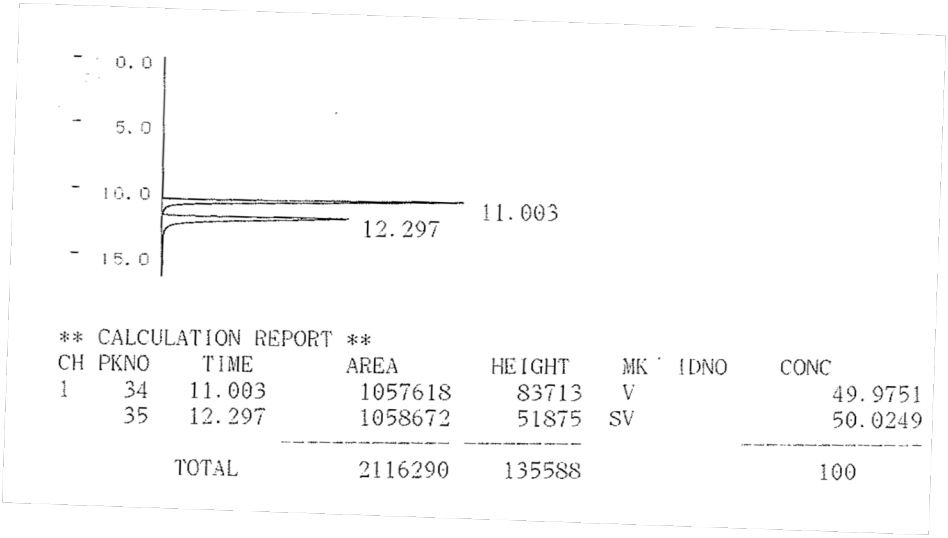


** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	32	15.112	344247	15110	SV		93.1464
	34	17.796	25329	737	T		6.8535
		TOTAL	369576	15846			100

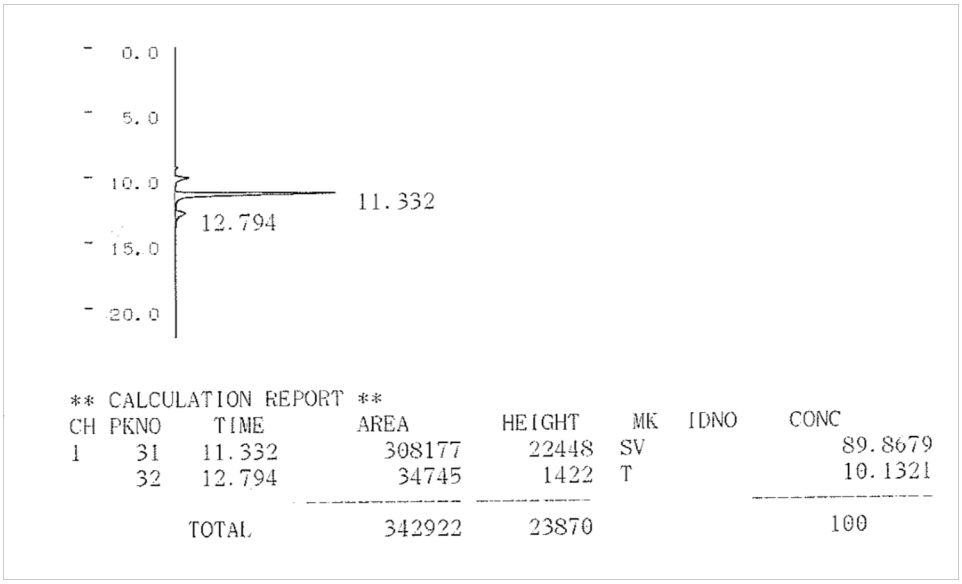


8,8-Dimethyl-6-(trifluoromethyl)benzosilolo[2,3-a]ferrocene (2ea).
Isolated by thin-layer chromatography (hexane only, Rf = 0.45) and purified by gel permeation chromatography (GPC). The title compound was obtained as orange solid (53%). ^{1}H NMR δ 7.62 (s, 1H), 7.50 (d, J = 7.9 Hz, 1H), 7.39 (s, J = 8.2 Hz, 1H), 4.82 (d, J = 1.4 Hz, 1H), 4.59 (t, J = 2.6 Hz, 1H), 4.43 (d, J = 1.4 Hz, 1H), 3.99 (s, 5H), 0.70 (s, 3H), 0.34 (s, 3H); ^{13}C NMR δ 152.2, 142.9, 128.9 (q, $J_{C\text{-}F}$ = 4.17, 4.17 Hz, 1C), 127.0, 126.8, 126.6 (q, $J_{C\text{-}F}$ = 3.87, 3.58 Hz, 1C), 121.9, 95.0, 74.0, 72.2, 71.3, 69.9, 64.7, -0.89, -1.77. IR (CH_2Cl_2 cast film): 2929, 2360, 1602, 1323, 1119, 1073; HRMS(ESI) calcd for $C_{19}H_{17}F_3FeSi$ (M^+): 386.0396; found: 386.0396. $[\alpha]^{24}_D$ = -245 (c 0.25, $CHCl_3$, 80% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IF-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 11.3 min for major isomer and 12.8 min for minor isomer).



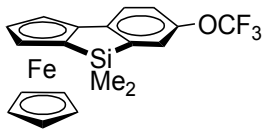
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	34	11.003	1057618	83713	V		49.9751
	35	12.297	1058672	51875	SV		50.0249
		TOTAL	2116290	135588			100

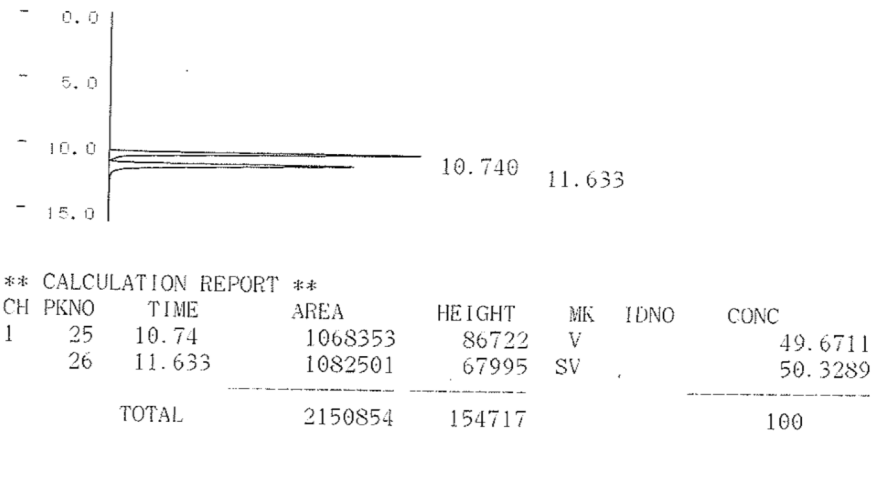


** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	31	11.332	308177	22448	SV		89.8679
	32	12.794	34745	1422	T		10.1321
		TOTAL	342922	23870			100

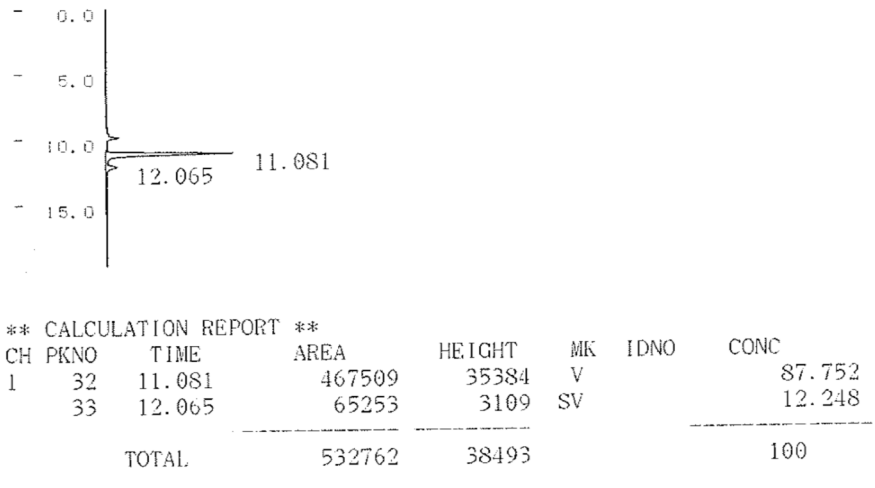


8,8-Dimethyl-6-(trifluoromethoxy)benzosilolo[2,3-a]ferrocene (2fa).
Isolated by thin-layer chromatography (hexane only, Rf = 0.45) and purified by gel permeation chromatography (GPC). The title compound was obtained as orange oil (55%). ^{1}H NMR δ 7.30 (d, J = 8.2 Hz, 1H), 7.23 (s, 1H), 7.09 (d, J = 8.8 Hz, 1H), 4.75 (d, J = 1.6 Hz, 1H), 4.54 (t, J = 2.2 Hz, 1H), 4.37 (d, J = 1.6 Hz, 1H), 3.99 (s, 5H), 0.68 (s, 3H), 0.32 (s, 3H); ^{13}C NMR δ 147.2, 146.6, 144.5, 124.9, 122.2, 121.5, 119.5, 95.6, 73.5, 71.7, 70.9, 69.8, 64.2, -0.89, -1.71. IR (CH_2Cl_2 cast film): 2926, 2359, 1770, 1255, 1163; HRMS(ESI) calcd for $C_{19}H_{17}F_3FeOSi$ (M^+): 402.0345; found: 402.0345. $[\alpha]^{24}D$ = -175 (c 0.25, $CHCl_3$, 76% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IF-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 11.1 min for major isomer and 12.1 min for minor isomer).



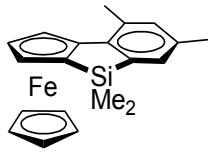
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	25	10.74	1068353	86722	V		49.6711
	26	11.633	1082501	67995	SV		50.3289
		TOTAL	2150854	154717			100



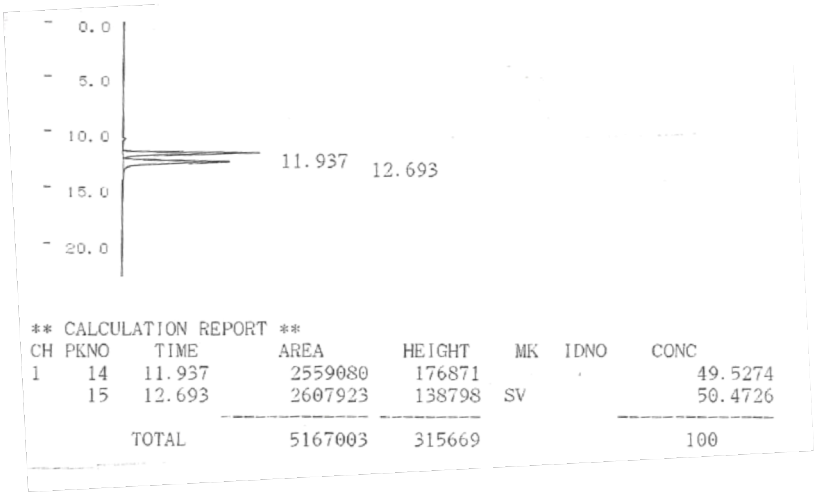
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	32	11.081	467509	35384	V		87.752
	33	12.065	65253	3109	SV		12.248
		TOTAL	532762	38493			100



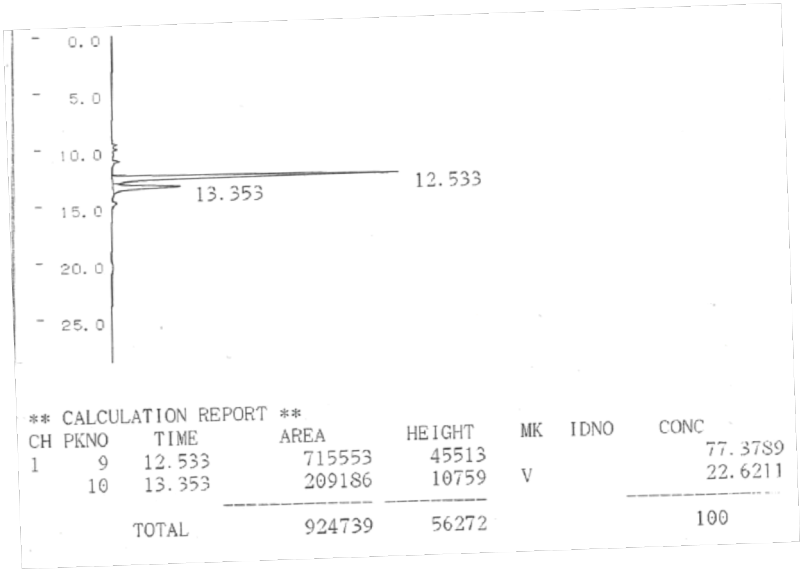
4,6,8,8-Tetramethylbenzosilolo[2,3-a]ferrocene (2ga).

Isolated by thin-layer chromatography (hexane only, Rf = 0.3) and purified by gel permeation chromatography (GPC). The title compound was obtained as orange oil (75%). ^{1}H NMR δ 7.09 (s, 1H), 6.90 (s, 1H), 4.79 (d, *J* = 2.1 Hz, 1H), 4.51 (t, *J* = 2.1 Hz, 1H), 4.33 (d, *J* = 2.1 Hz, 1H), 3.99 (s, 5H), 2.46 (s, 3H), 2.29 (s, 3H), 0.63 (s, 3H), 0.29 (s, 3H); ^{13}C NMR δ 142.0, 141.7, 133.5, 131.6, 130.7, 129.8, 96.2, 72.3, 70.9, 69.2, 68.3, 66.6, 20.1, 20.0, -1.8, -2.6. IR (CH_2Cl_2 cast film): 2921, 2321, 1507, 866, 775 cm^{-1}. HRMS(ESI) calcd for $C_{20}H_{22}FeSi$ (M^+): 346.0835; found: 346.0834. $[\alpha]^{19}_D$ = -71 (c 0.68, $CHCl_3$, 55% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IF-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 12.2 min for major isomer and 13.0 min for minor isomer).



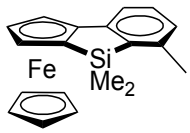
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	14	11.937	2559080	176871			49.5274
	15	12.693	2607923	138798	SV		50.4726
		TOTAL	5167003	315669			100



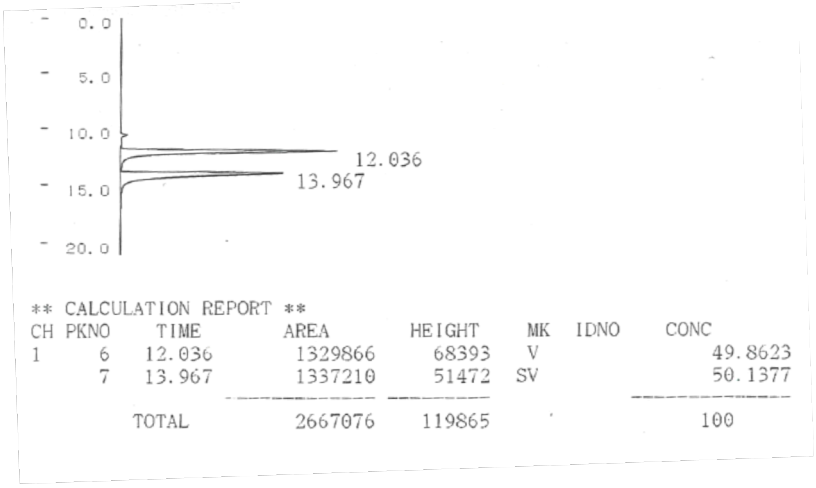
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	9	12.533	715553	45513			77.3789
	10	13.353	209186	10759	V		22.6211
		TOTAL	924739	56272			100



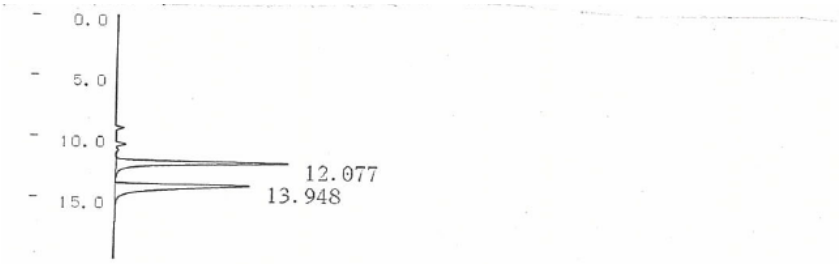
7,8,8-Trimethyl-benzosilolo[2,3-a]ferrocene (2ha).

Isolated by thin-layer chromatography (hexane only, Rf = 0.3) and purified by gel permeation chromatography (GPC). The title compound was obtained as orange oil (67%). ^{1}H NMR δ 7.17 (d, J = 4.4 Hz, 2H), 6.92 (t, J = 4.4 Hz, 1H), 4.75 (d, J = 2.2 Hz, 1H), 4.50 (t, J = 2.2 Hz, 1H), 4.34 (d, J = 2.2 Hz, 1H), 3.98 (s, 5H), 2.39 (s, 3H), 0.72 (s, 3H), 0.36 (s, 3H); ^{13}C NMR δ 149.1, 146.8, 132.6, 126.3, 121.7, 116.9, 95.4, 73.9, 71.8, 71.0, 69.8, 69.6, 64.5, -0.9, -1.8. IR (CH_2Cl_2 cast film): 2922, 2359, 1245, 785, 439 cm^{-1}. HRMS(ESI) calcd for $C_{19}H_{20}FeSi$ (M^+): 332.0678; found: 332.0678. $[\alpha]^{18}_D$ = -13 (c 0.55, $CHCl_3$, 5% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IA-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 13.9 min for major isomer and 12.0 min for minor isomer).



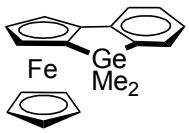
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	6	12.036	1329866	68393	V		49.8623
	7	13.967	1337210	51472	SV		50.1377
	TOTAL		2667076	119865			100



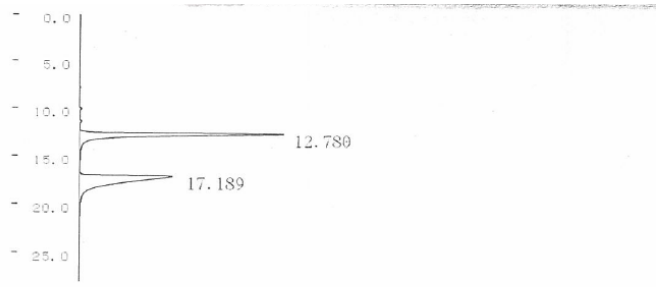
** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	1	12.077	1943356	101849			47.3095
	2	13.948	2164397	79770			52.6905
	TOTAL		4107752	181619			100



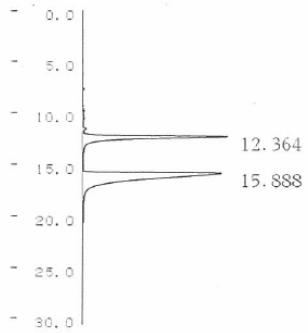
8,8-Dimethylbenzogermolo[2,3-a]ferrocene (5).

Isolated by thin-layer chromatography (hexane only, Rf = 0.3). The title compound was obtained as orange oil (40%). ^{1}H NMR δ 7.43 (d, *J* = 7.1 Hz, 1H), 7.38 (d, *J* = 7.4 Hz, 1H), 7.22-7.28 (m, 1H, overlap with $CHCl_3$), 7.13 (t, *J* = 7.4 Hz, 1H), 4.76 (s, 1H), 4.48 (s, 1H), 4.37 (s, 1H), 3.97 (s, 5H), 0.83 (s, 3H), 0.49 (s, 3H); ^{13}C NMR δ 146.6, 144.4, 132.6, 128.9, 125.4, 121.4, 95.7, 75.4, 72.4, 70.5, 69.5, 63.7, -0.6, -1.0. IR (CH_2Cl_2 cast film): 2960, 1727, 1268, 1124, 767 cm^{-1}. HRMS(ESI) calcd for $C_{18}H_{18}FeGe$ (M^+): 359.9995; found: 359.9996. $[\alpha]^{15}_{D}$ = -184 (c 0.19, $CHCl_3$, 33% ee). Ee was determined by HPLC analysis using a chiral column (Daicel Chiralpak IA-3: 4.6 x 250 mm, 254 nm UV detector, rt, eluent: hexane only, flow rate: 0.5 mL/min, retention time: 15.9 min for major isomer and 12.4 min for minor isomer).



** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	25	12.78	1798027	77206	SV		50.1242
	28	17.189	1789119	35128	SV		49.8758
		TOTAL	3587146	112334			100

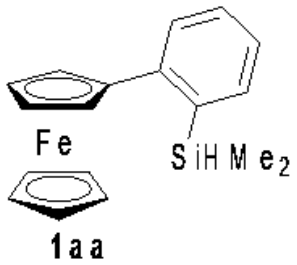


** CALCULATION REPORT **

CH	PKNO	TIME	AREA	HEIGHT	MK	IDNO	CONC
1	20	12.364	1089891	51485	SV		33.5081
	23	15.888	2162732	49636	SV		66.4919
		TOTAL	3252623	101121			100

No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.10	63.81	8	4.47	4.38	15	7.26	4.01	22	7.41	2.72	29	7.91	4.67
2	0.11	64.70	9	4.48	16.20	16	7.26	3.73	23	7.45	5.10	30	7.91	4.61
3	4.17	99.97	10	4.48	19.62	17	7.37	2.91	24	7.45	4.78			
4	4.26	11.76	11	4.49	15.27	18	7.38	3.29	25	7.47	4.28			
5	4.27	18.44	12	7.23	2.56	19	7.39	4.85	26	7.47	3.98			
6	4.27	13.05	13	7.24	5.59	20	7.40	5.32	27	7.89	5.00			
7	4.46	1.94	14	7.24	5.80	21	7.41	2.61	28	7.89	5.04			

No.	Start(ppm)	End(ppm)	Integral
1	0.1452	0.0863	5.9941
2	4.2295	4.1098	4.9059
3	4.2973	4.2295	2.0163
4	4.5485	4.4371	2.9198
5	7.2749	7.2133	1.4876
6	7.4314	7.3244	1.0477
7	7.5074	7.4314	0.988
8	7.9562	7.8336	1.0



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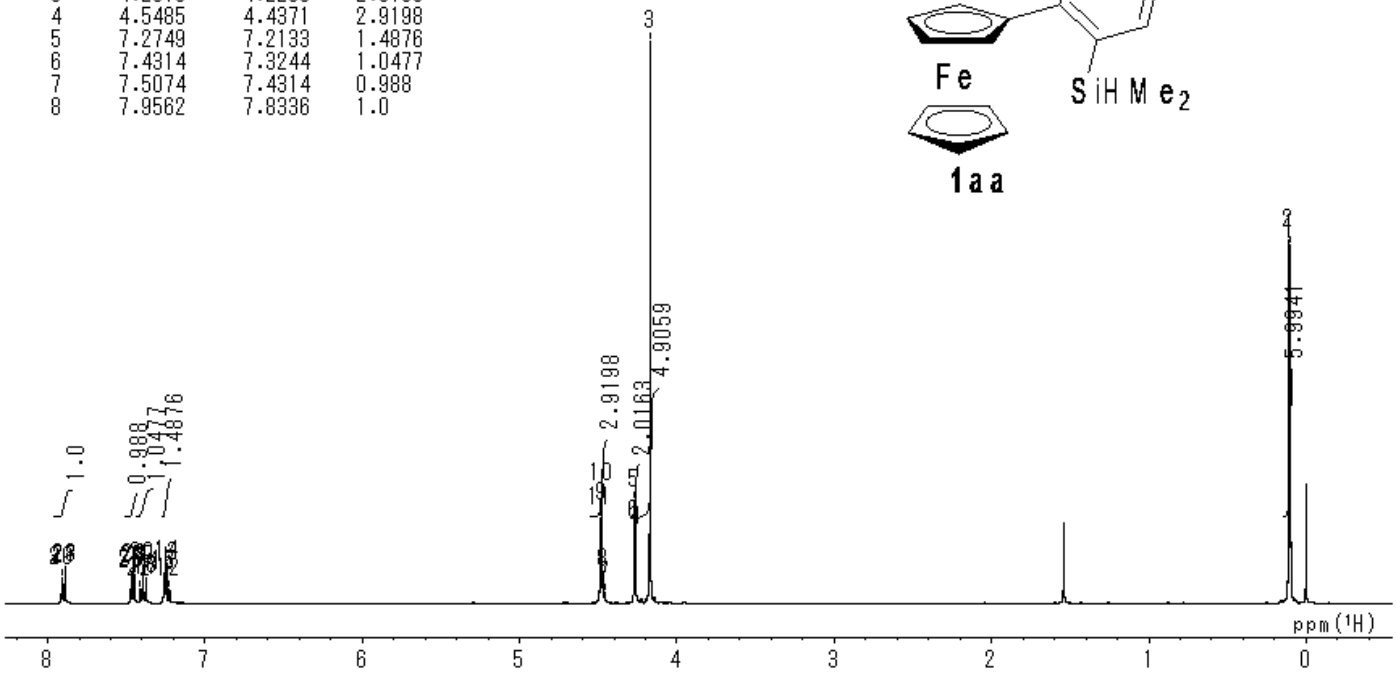
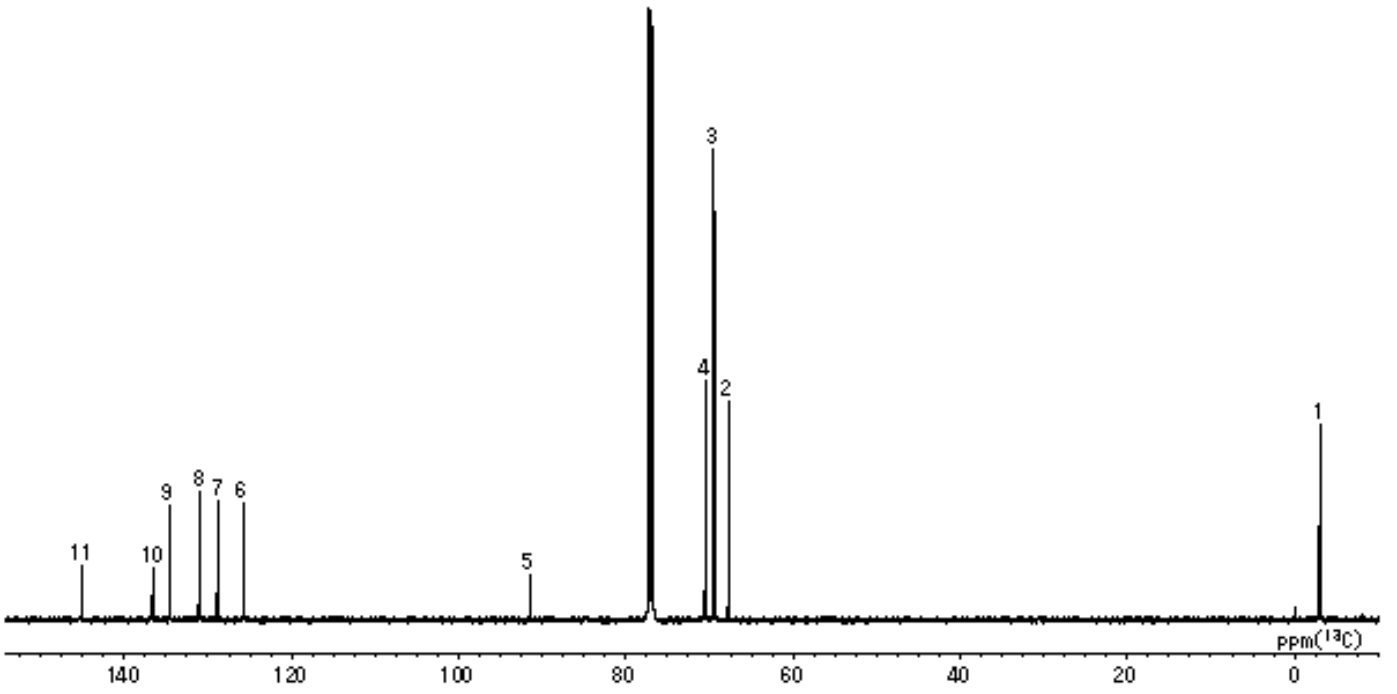
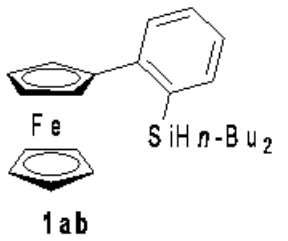


No.	δ/ppm	Height	No.	δ/ppm	Height
1	-3.01	30.78	7	128.87	18.09
2	67.72	34.26	8	131.07	19.51
3	69.45	75.51	9	134.61	17.45
4	70.52	37.63	10	136.62	7.10
5	91.44	6.09	11	145.04	7.61
6	125.71	17.69			



No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.60	8.97	10	1.19	6.89	19	4.24	8.96	28	7.22	6.47	37	7.39	3.03
2	0.61	9.70	11	1.20	11.16	20	4.24	16.63	29	7.22	6.24	38	7.43	5.63
3	0.62	10.47	12	1.21	15.44	21	4.25	21.90	30	7.24	4.29	39	7.44	5.46
4	0.62	10.24	13	1.22	15.74	22	4.25	16.15	31	7.24	4.10	40	7.45	4.84
5	0.64	6.34	14	1.23	17.14	23	4.44	14.59	32	7.36	3.59	41	7.45	4.52
6	0.79	20.94	15	1.24	16.48	24	4.44	19.82	33	7.36	3.72	42	7.89	5.63
7	0.81	43.35	16	1.25	12.93	25	4.44	13.88	34	7.37	5.65	43	7.89	5.53
8	0.82	24.36	17	4.17	99.95	26	7.21	3.39	35	7.38	5.61	44	7.91	5.18
9	1.18	6.53	18	4.23	6.47	27	7.21	3.43	36	7.39	3.24	45	7.91	4.89

No.	Start(ppm)	End(ppm)	Integral
1	0.6683	0.5391	4.029
2	0.8597	0.7355	5.9455
3	1.2885	1.1481	7.9718
4	4.2061	4.0640	5.0149
5	4.2741	4.2061	2.9266
6	4.5543	4.3783	2.0847
7	7.2427	7.1738	1.0884
8	7.4095	7.3370	1.0422
9	7.5234	7.4095	0.963
10	8.0008	7.7042	1.0



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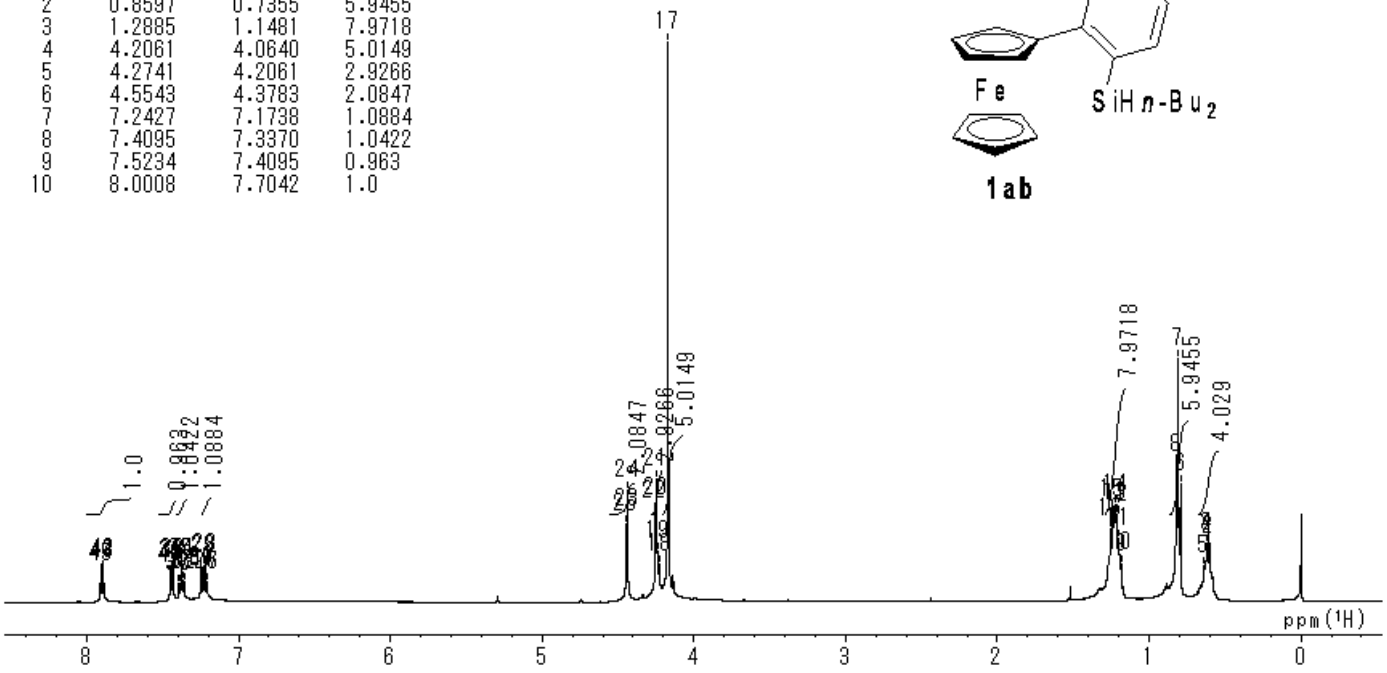
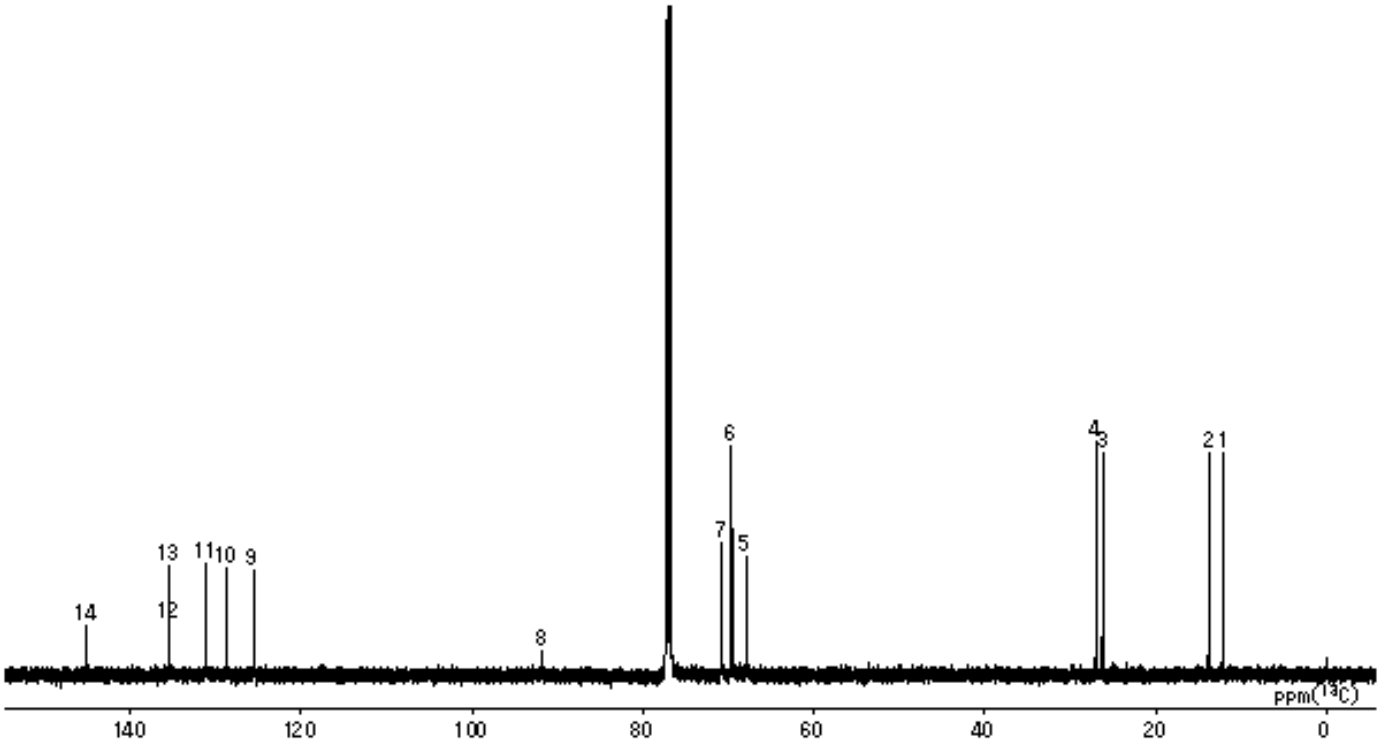


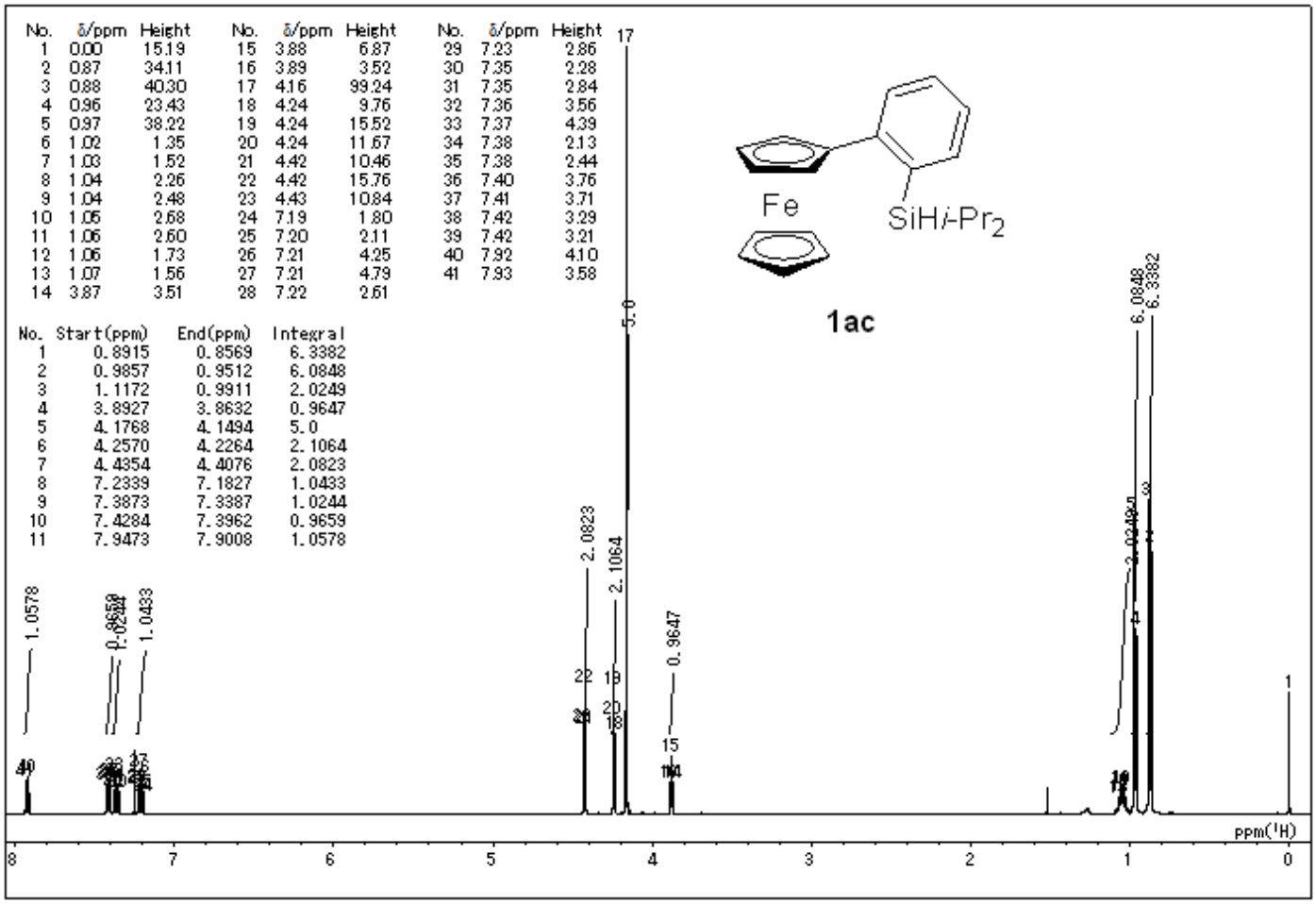
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	12.13	32.04	7	70.75	18.41	13	135.45	15.13
2	13.73	31.99	8	91.89	2.50	14	145.09	6.12
3	26.18	32.03	9	125.59	14.45			
4	26.95	33.55	10	128.67	14.87			
5	67.78	16.48	11	131.21	15.29			
6	69.61	33.07	12	135.37	6.45			



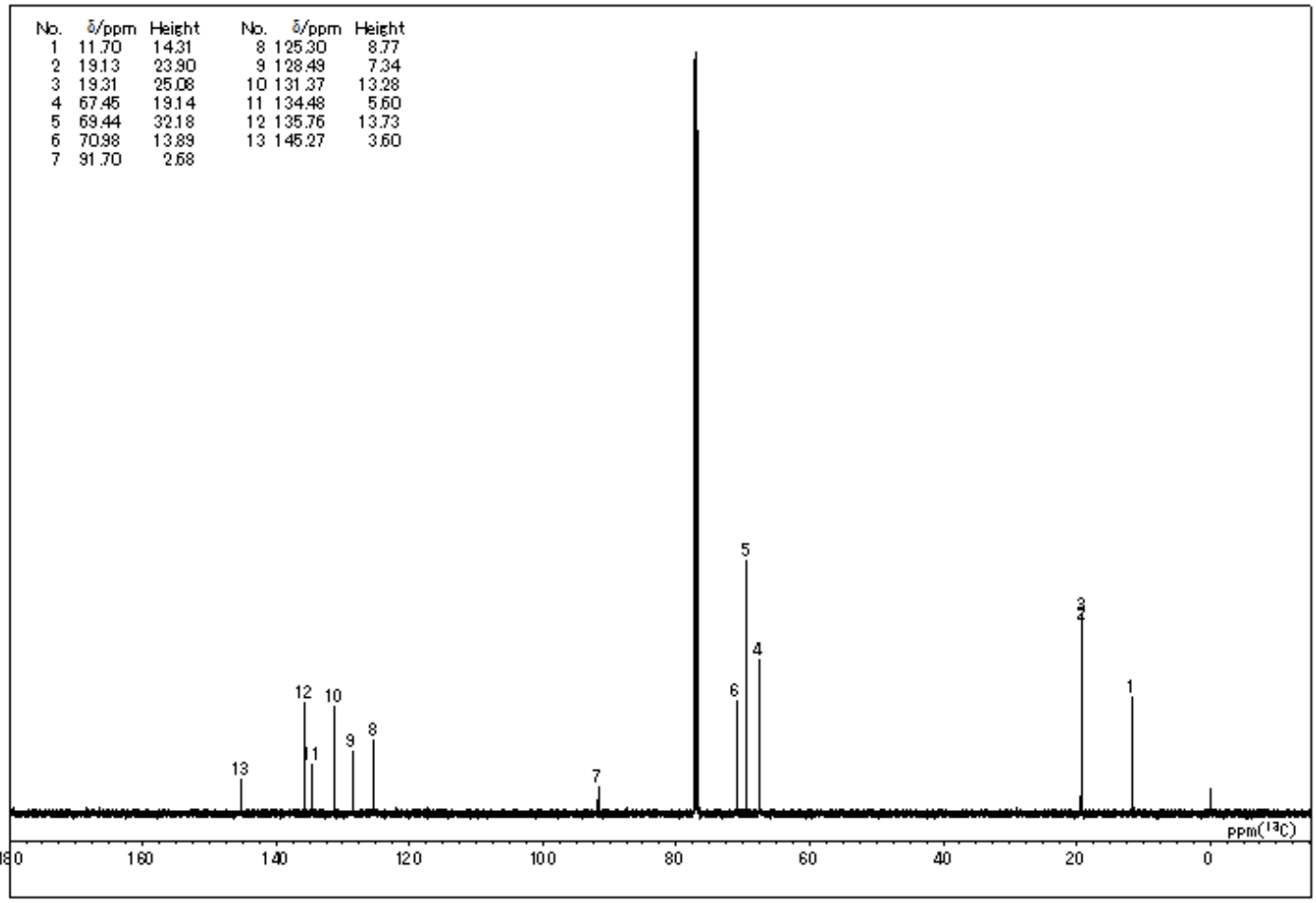
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.00	15.19	15	3.88	6.87	29	7.23	2.86
2	0.87	34.11	16	3.89	3.52	30	7.35	2.28
3	0.88	40.30	17	4.16	99.24	31	7.35	2.84
4	0.96	23.43	18	4.24	9.76	32	7.36	3.56
5	0.97	38.22	19	4.24	15.52	33	7.37	4.39
6	1.02	1.35	20	4.24	11.67	34	7.38	2.13
7	1.03	1.52	21	4.42	10.46	35	7.38	2.44
8	1.04	2.26	22	4.42	15.76	36	7.40	3.76
9	1.04	2.48	23	4.43	10.84	37	7.41	3.71
10	1.05	2.68	24	7.19	1.80	38	7.42	3.29
11	1.06	2.60	25	7.20	2.11	39	7.42	3.21
12	1.06	1.73	26	7.21	4.25	40	7.92	4.10
13	1.07	1.56	27	7.21	4.79	41	7.93	3.58
14	3.87	3.51	28	7.22	2.61			

No.	Start(ppm)	End(ppm)	Integral
1	0.8915	0.8569	6.3382
2	0.9857	0.9512	6.0848
3	1.1172	0.9911	2.0249
4	3.8927	3.8632	0.9647
5	4.1768	4.1494	5.0
6	4.2570	4.2264	2.1064
7	4.4354	4.4076	2.0823
8	7.2339	7.1827	1.0433
9	7.3873	7.3387	1.0244
10	7.4284	7.3962	0.9659
11	7.9473	7.9008	1.0578

1ac



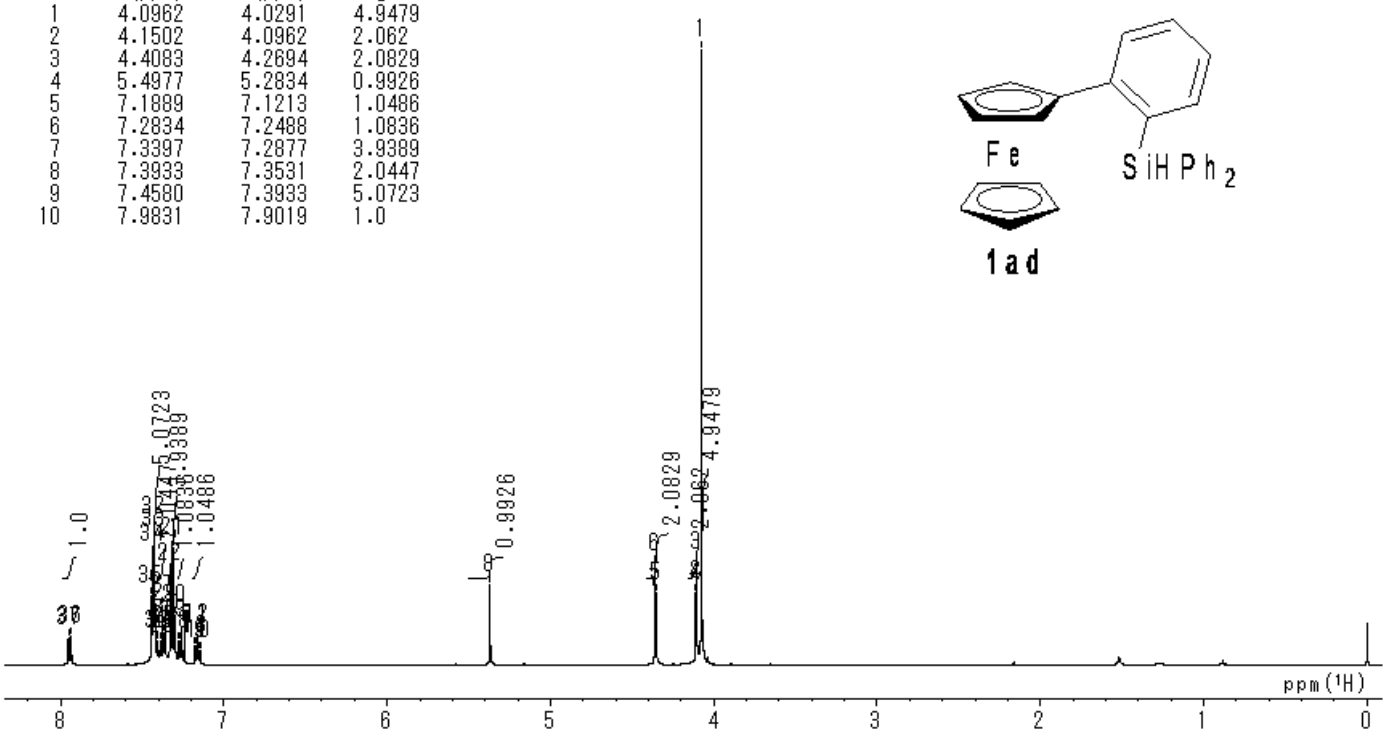
No.	δ/ppm	Height	No.	δ/ppm	Height
1	11.70	14.31	8	125.30	8.77
2	19.13	23.90	9	128.49	7.34
3	19.31	25.08	10	131.37	13.28
4	67.45	19.14	11	134.48	5.60
5	69.44	32.18	12	135.76	13.73
6	70.98	13.89	13	145.27	3.60
7	91.70	2.68			



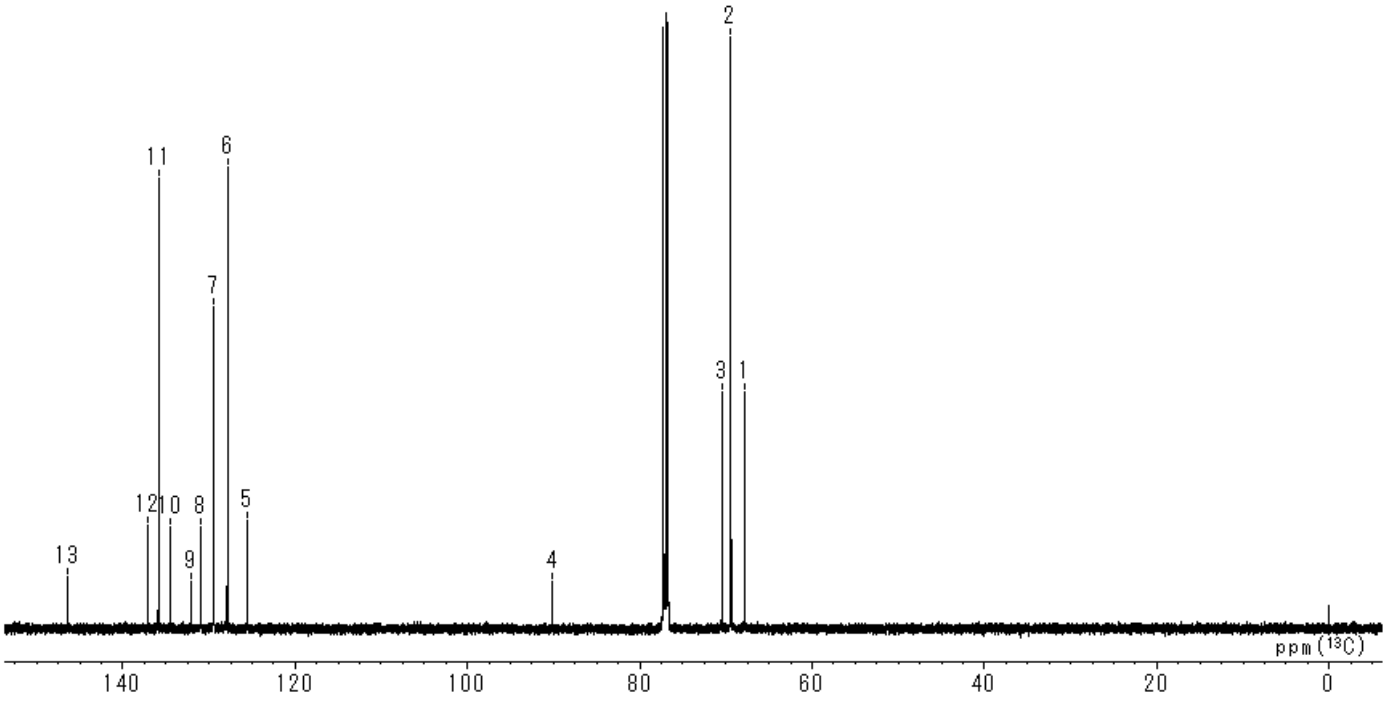
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	4.08	100.00	8	5.37	13.08	15	7.26	4.79	22	7.33	14.86	29	7.39	3.80	36	7.94	4.64
2	4.10	11.97	9	7.15	2.27	16	7.26	5.03	23	7.36	4.82	30	7.40	3.87	37	7.95	4.33
3	4.11	16.78	10	7.15	2.31	17	7.27	3.99	24	7.36	8.43	31	7.41	3.95			
4	4.11	11.72	11	7.16	4.95	18	7.28	3.89	25	7.36	5.86	32	7.42	22.59			
5	4.35	11.81	12	7.16	4.89	19	7.30	5.80	26	7.37	3.89	33	7.43	20.41			
6	4.36	16.49	13	7.18	3.23	20	7.30	8.11	27	7.37	9.75	34	7.44	17.95			
7	4.36	10.63	14	7.18	3.07	21	7.31	19.03	28	7.38	3.19	35	7.44	11.26			

No.	Start(ppm)	End(ppm)	Integral
1	4.0962	4.0291	4.9479
2	4.1502	4.0962	2.062
3	4.4083	4.2694	2.0829
4	5.4977	5.2834	0.9926
5	7.1889	7.1213	1.0486
6	7.2834	7.2488	1.0836
7	7.3397	7.2877	3.9389
8	7.3933	7.3531	2.0447
9	7.4580	7.3933	5.0723
10	7.9831	7.9019	1.0

1ad

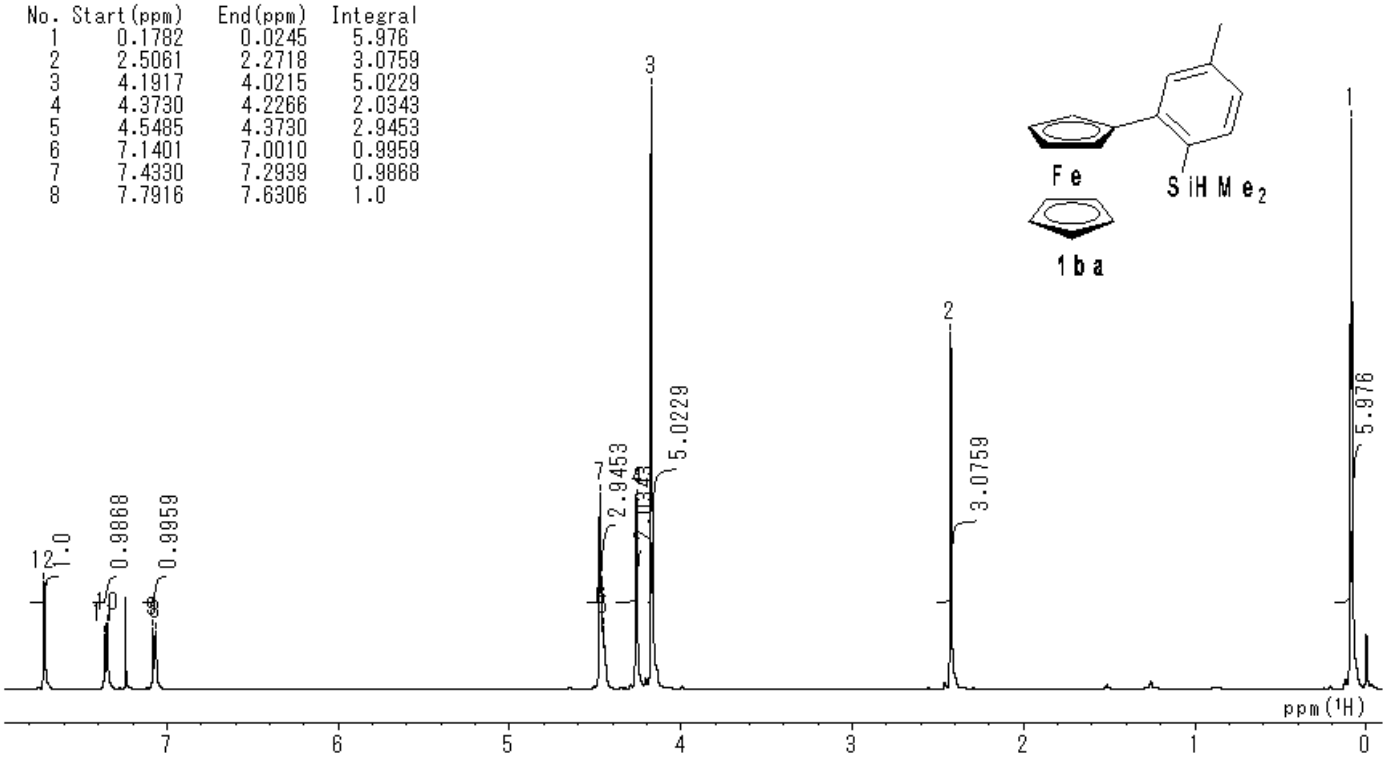


No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	67.81	38.30	6	127.85	74.92	11	135.84	73.23
2	69.43	96.20	7	129.44	52.33	12	137.04	16.86
3	70.49	38.33	8	130.93	16.58	13	146.33	8.35
4	90.17	7.56	9	132.03	7.47			
5	125.52	17.47	10	134.50	16.44			

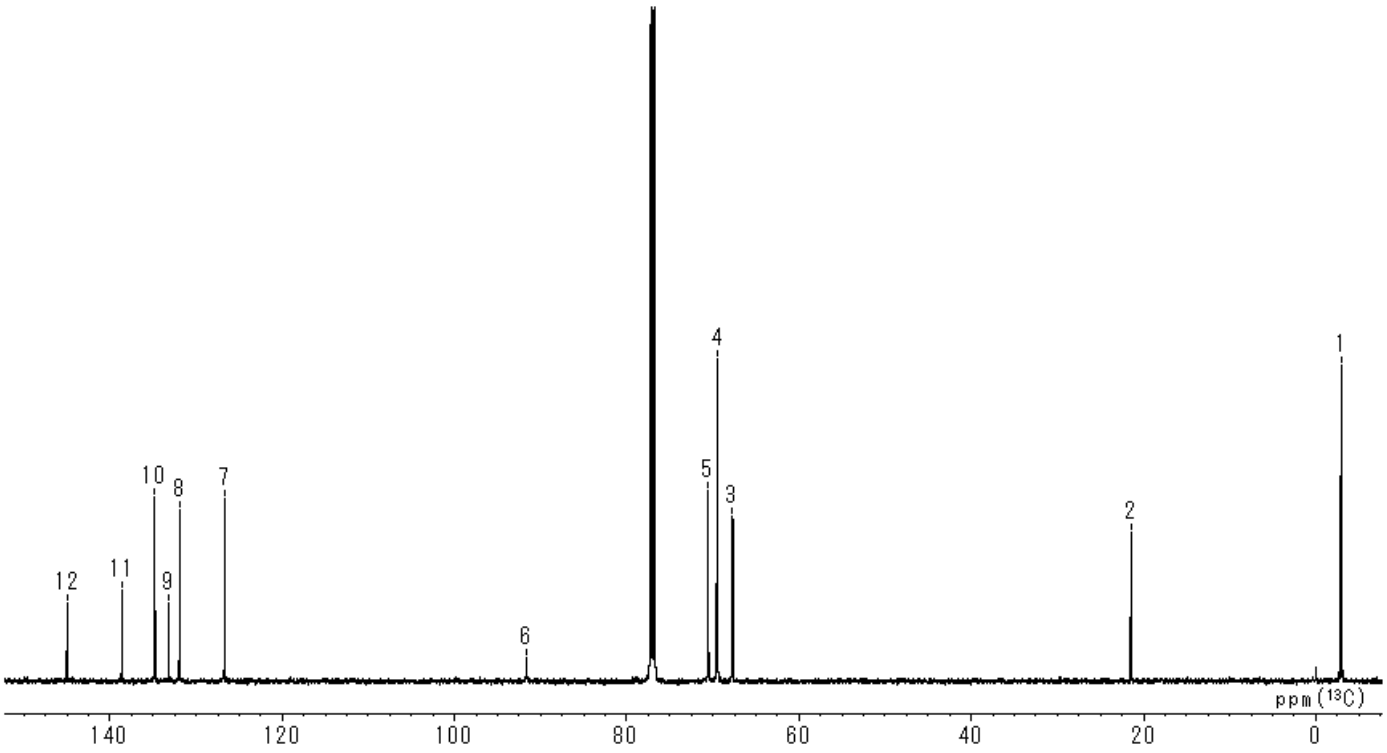


No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.09	84.43	8	7.07	8.67
2	2.43	52.86	9	7.08	8.94
3	4.17	89.08	10	7.35	9.80
4	4.26	28.35	11	7.37	8.06
5	4.45	9.26	12	7.72	16.00
6	4.46	10.73			
7	4.47	29.06			

No.	Start(ppm)	End(ppm)	Integral
1	0.1782	0.0245	5.976
2	2.5061	2.2718	3.0759
3	4.1917	4.0215	5.0229
4	4.3730	4.2266	2.0343
5	4.5485	4.3730	2.9453
6	7.1401	7.0010	0.9959
7	7.4330	7.2939	0.9868
8	7.7916	7.6306	1.0



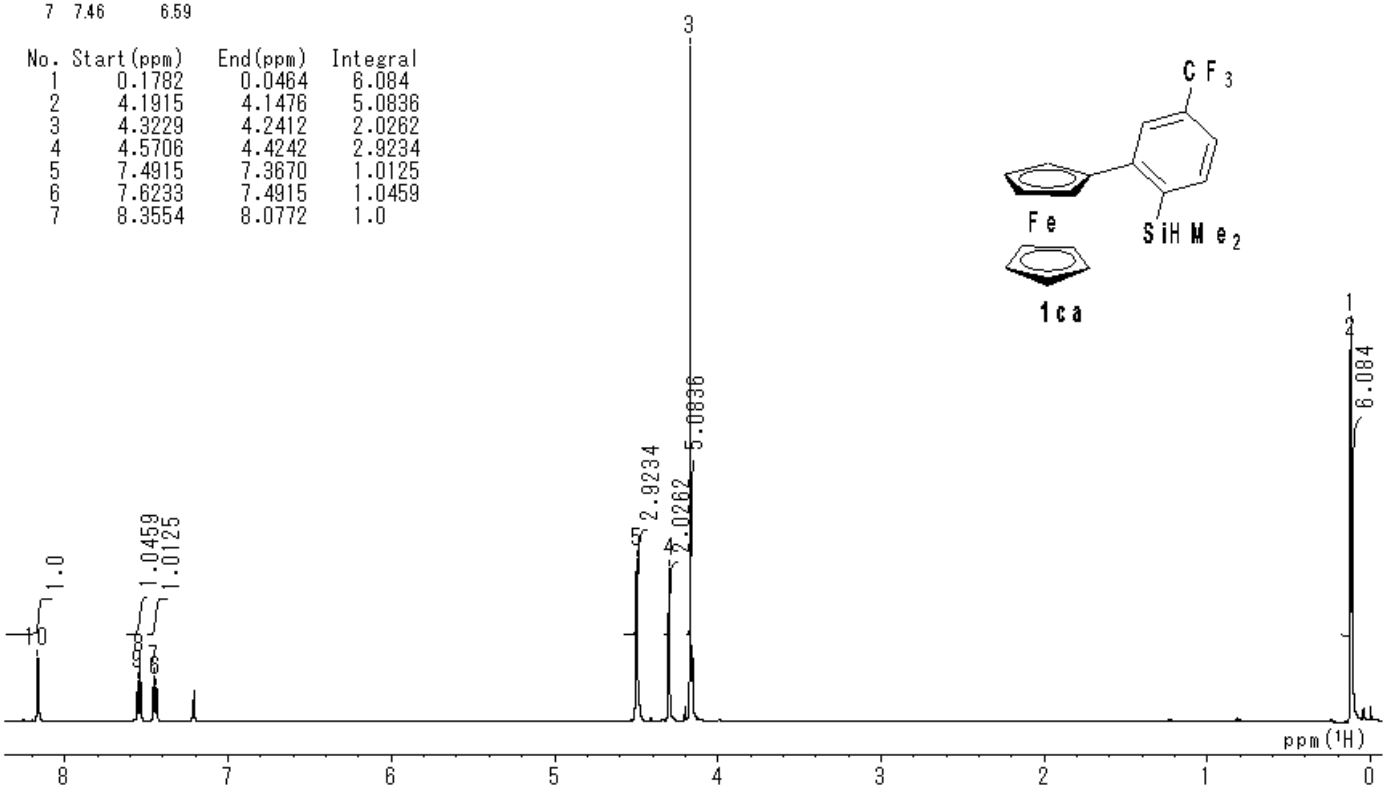
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	−2.93	46.62	6	91.60	3.38	11	138.64	13.36
2	21.48	21.92	7	126.70	26.75	12	145.01	11.33
3	67.70	24.16	8	131.94	25.17			
4	69.50	47.43	9	133.14	11.37			
5	70.53	27.98	10	134.79	27.17			



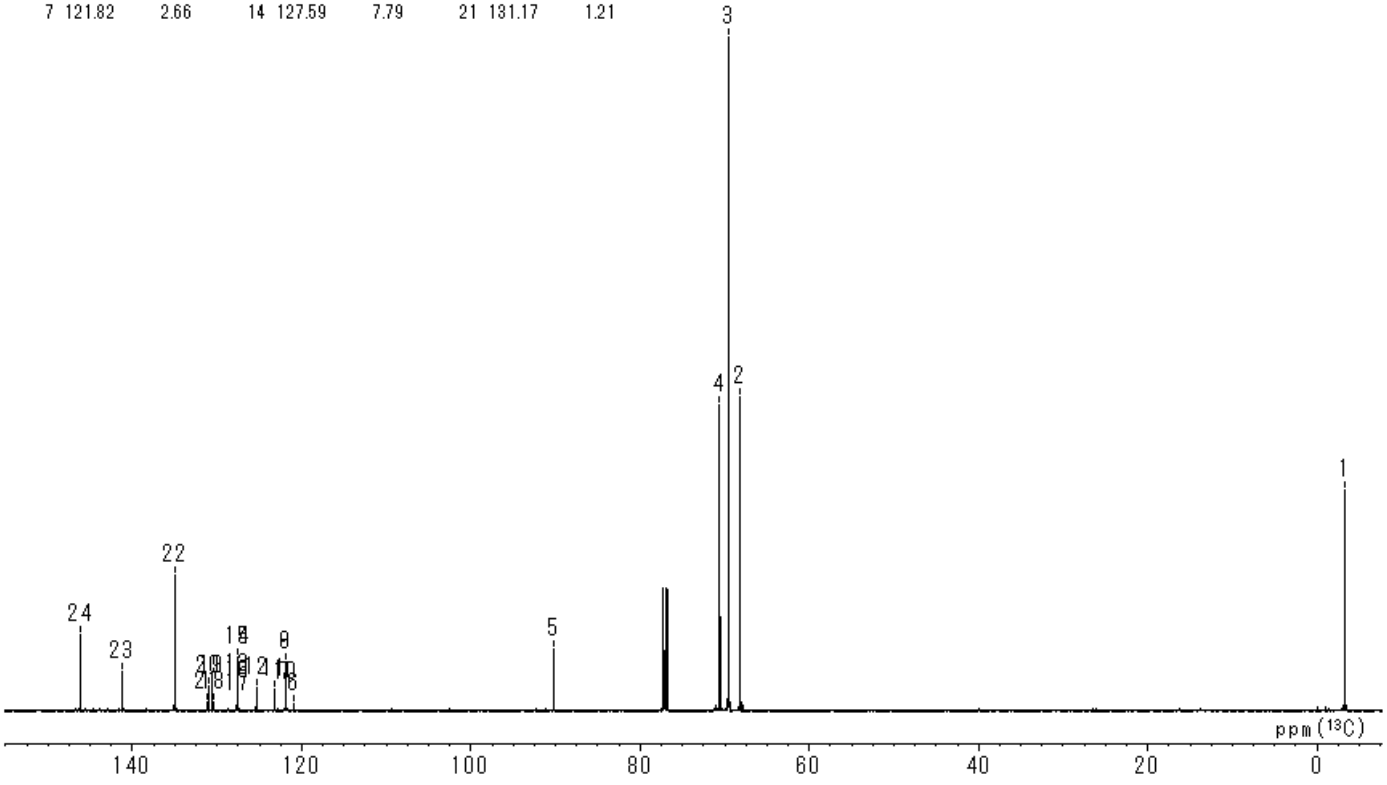
No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.12	58.60	8	7.54	8.21
2	0.12	55.14	9	7.55	5.99
3	4.17	99.75	10	8.17	9.38
4	4.30	22.46			
5	4.50	24.08			
6	7.44	4.97			
7	7.46	6.59			

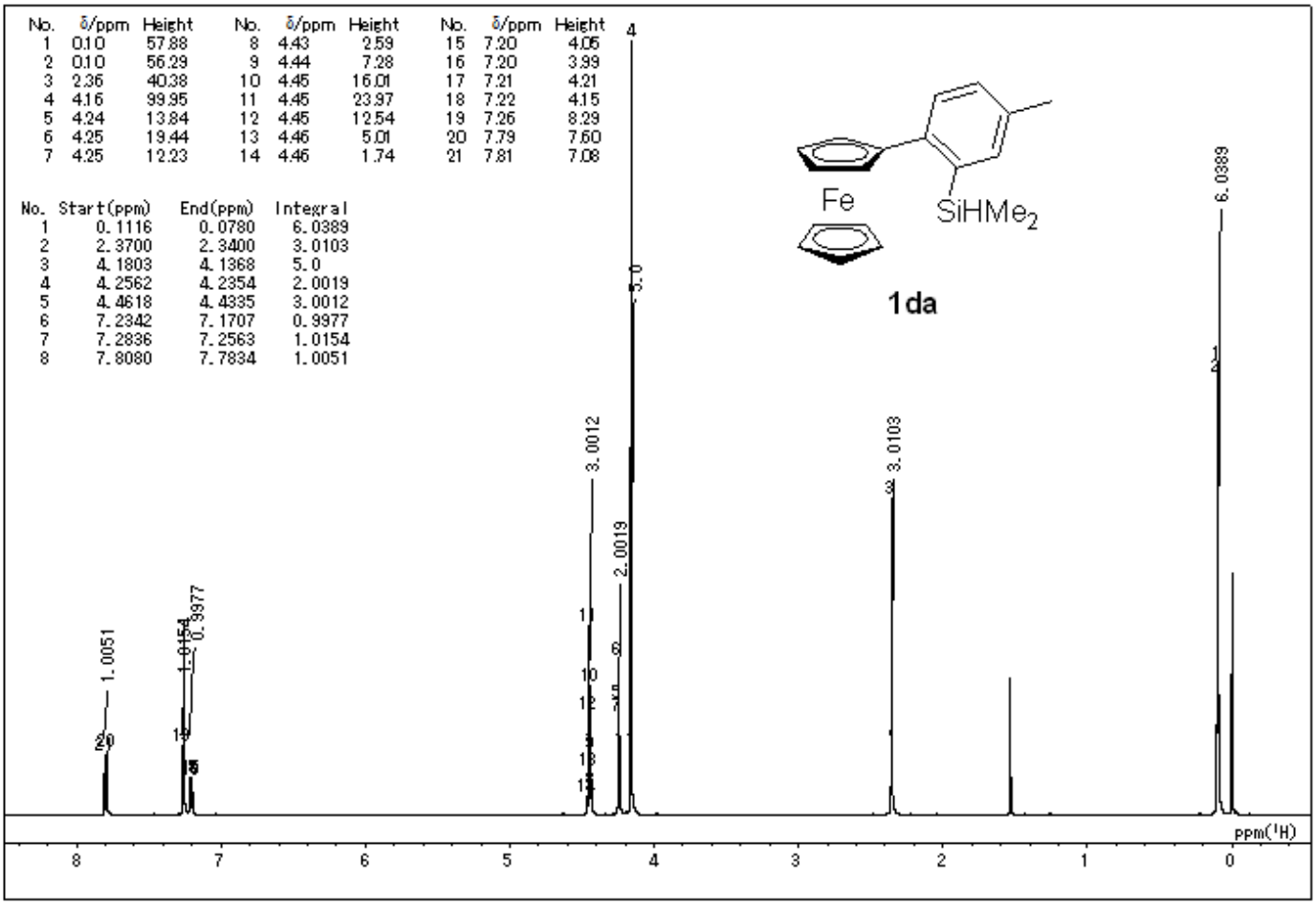
No.	Start(ppm)	End(ppm)	Integral
1	0.1782	0.0464	6.084
2	4.1915	4.1476	5.0836
3	4.3229	4.2412	2.0262
4	4.5706	4.4242	2.9234
5	7.4915	7.3670	1.0125
6	7.6233	7.4915	1.0459
7	8.3554	8.0772	1.0

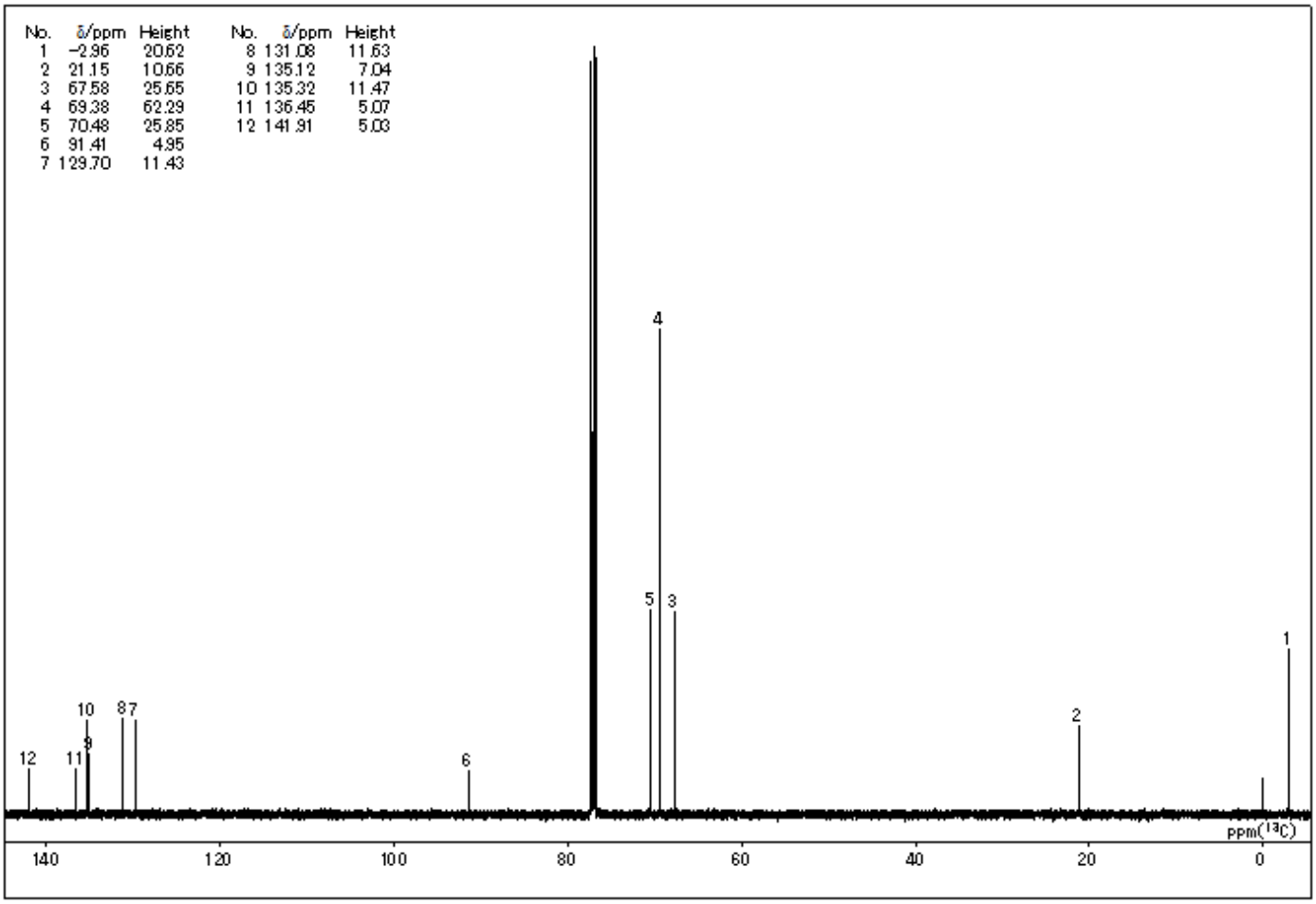
1ca

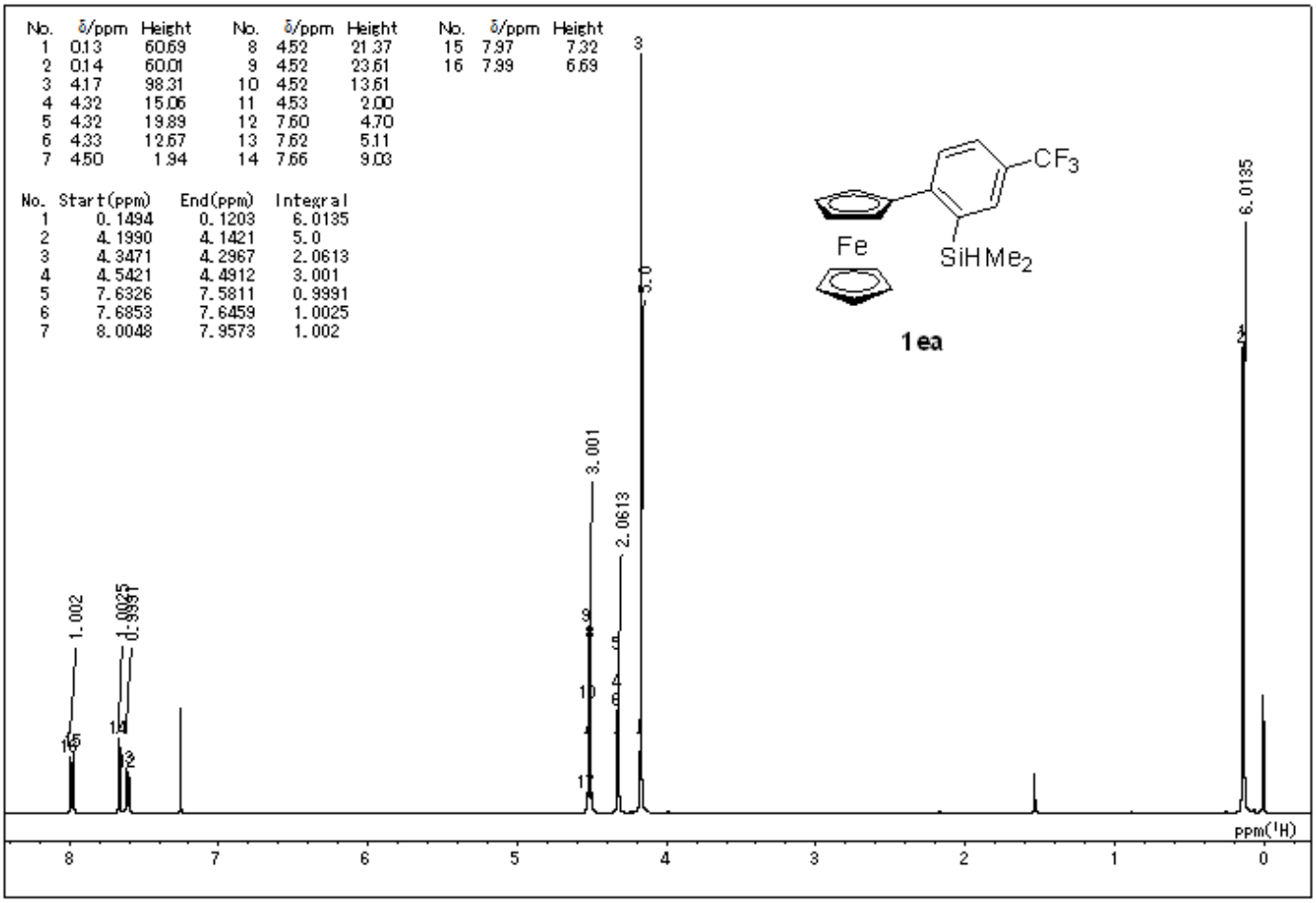


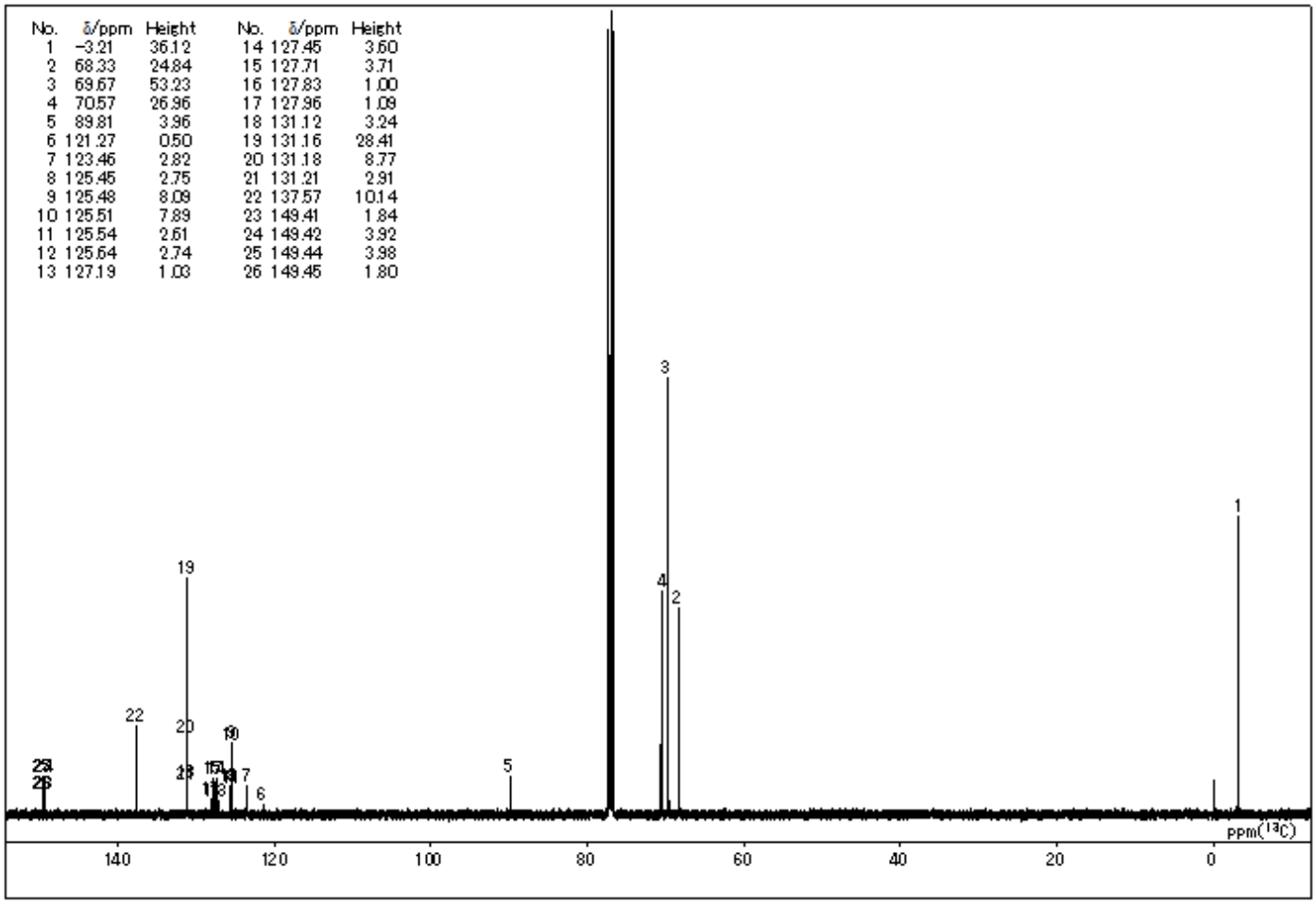
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	-3.26	32.46	8	121.85	7.04	15	127.62	7.81	22	135.02	20.04
2	68.16	46.41	9	121.88	7.05	16	127.65	2.81	23	141.25	5.71
3	69.58	99.55	10	121.90	2.64	17	127.66	0.92	24	146.22	11.23
4	70.59	45.04	11	123.18	3.01	18	130.40	1.20			
5	90.20	9.04	12	125.37	3.30	19	130.66	3.62			
6	121.00	0.99	13	127.56	3.81	20	130.91	3.61			
7	121.82	2.66	14	127.59	7.79	21	131.17	1.21			




No. δ/ppm Height
1 0.10 57.88
2 0.10 56.29
3 2.36 40.38
4 4.16 99.95
5 4.24 13.84
6 4.25 19.44
7 4.25 12.23
8 4.43 2.59
9 4.44 7.28
10 4.45 16.01
11 4.45 23.97
12 4.45 12.54
13 4.46 5.01
14 4.46 1.74
15 7.20 4.05
16 7.20 3.99
17 7.21 4.21
18 7.22 4.15
19 7.26 8.29
20 7.79 7.60
21 7.81 7.08
No. Start(ppm) End(ppm) Integral
1 0.1116 0.0780 6.0389
2 2.3700 2.3400 3.0103
3 4.1803 4.1368 5.0
4 4.2562 4.2354 2.0019
5 4.4618 4.4335 3.0012
6 7.2342 7.1707 0.9977
7 7.2836 7.2563 1.0154
8 7.8080 7.7834 1.0051
Fe
SiHMe2
1da
6.0389
5.0
3.0103
3.0012
2.0019
1.0051
0.9977
1.0154
ppm(1H)


No. δ/ppm Height
1 -2.96 20.62
2 21.15 10.66
3 67.58 25.65
4 69.38 62.29
5 70.48 25.85
6 91.41 4.95
7 129.70 11.43
8 131.08 11.63
9 135.12 7.04
10 135.32 11.47
11 136.45 5.07
12 141.91 5.03
ppm(13C)

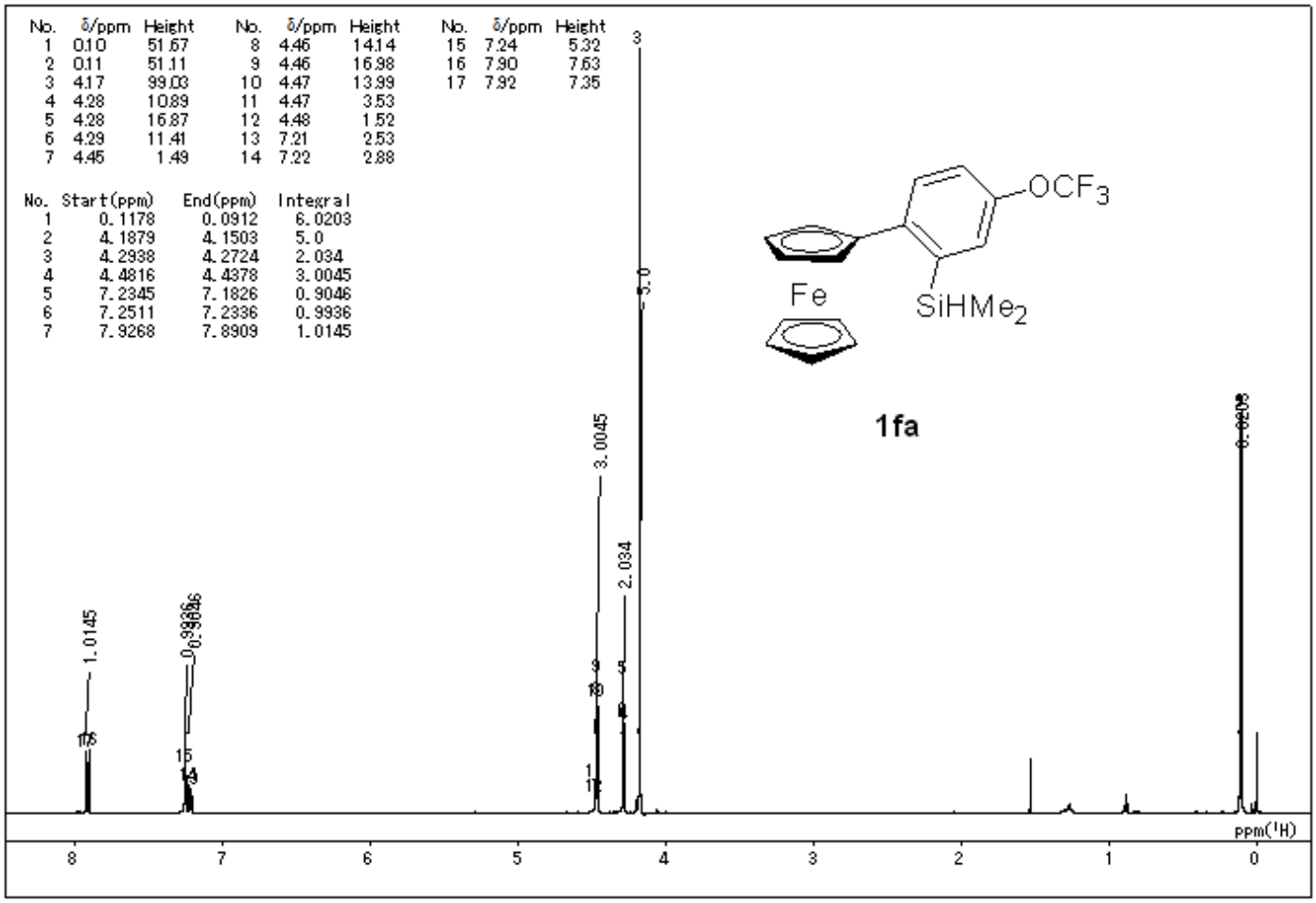

No. δ/ppm Height
1 0.13 60.69
2 0.14 60.01
3 4.17 98.31
4 4.32 15.06
5 4.32 19.89
6 4.33 12.67
7 4.50 1.94
8 4.52 21.37
9 4.52 23.61
10 4.52 13.61
11 4.53 2.00
12 7.60 4.70
13 7.62 5.11
14 7.66 9.03
15 7.97 7.32
16 7.99 6.69
No. Start(ppm) End(ppm) Integral
1 0.1494 0.1203 6.0135
2 4.1990 4.1421 5.0
3 4.3471 4.2967 2.0613
4 4.5421 4.4912 3.001
5 7.6326 7.5811 0.9991
6 7.6853 7.6459 1.0025
7 8.0048 7.9573 1.002
CF3
Fe
SiHMe2
1ea
6.0135
5.0
3.001
2.0613
1.002
0.9991
1.0025
ppm(1H)


No. δ/ppm Height
1 -3.21 36.12
2 68.33 24.84
3 69.67 53.23
4 70.57 26.96
5 89.81 3.96
6 121.27 0.50
7 123.46 2.82
8 125.45 2.75
9 125.48 8.09
10 125.51 7.89
11 125.54 2.61
12 125.64 2.74
13 127.19 1.03
14 127.45 3.60
15 127.71 3.71
16 127.83 1.00
17 127.96 1.09
18 131.12 3.24
19 131.16 28.41
20 131.18 8.77
21 131.21 2.91
22 137.57 10.14
23 149.41 1.84
24 149.42 3.92
25 149.44 3.98
26 149.45 1.80
ppm(13C)

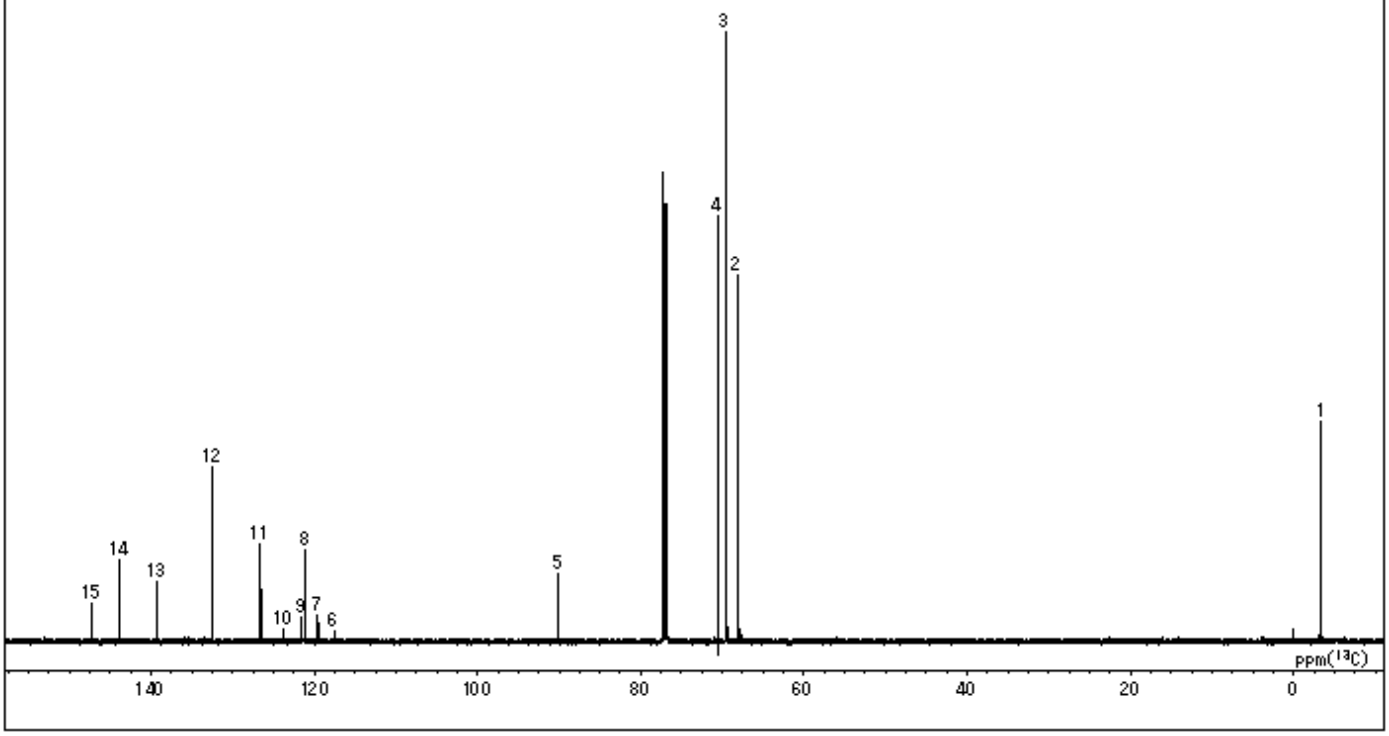
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.10	51.67	8	4.46	14.14	15	7.24	5.32
2	0.11	51.11	9	4.46	16.98	16	7.90	7.63
3	4.17	99.03	10	4.47	13.99	17	7.92	7.35
4	4.28	10.89	11	4.47	3.53			
5	4.28	16.87	12	4.48	1.52			
6	4.29	11.41	13	7.21	2.53			
7	4.45	1.49	14	7.22	2.88			

No.	Start(ppm)	End(ppm)	Integral
1	0.1178	0.0912	6.0203
2	4.1879	4.1503	5.0
3	4.2938	4.2724	2.034
4	4.4816	4.4378	3.0045
5	7.2345	7.1826	0.9046
6	7.2511	7.2336	0.9936
7	7.9268	7.8909	1.0145

1fa

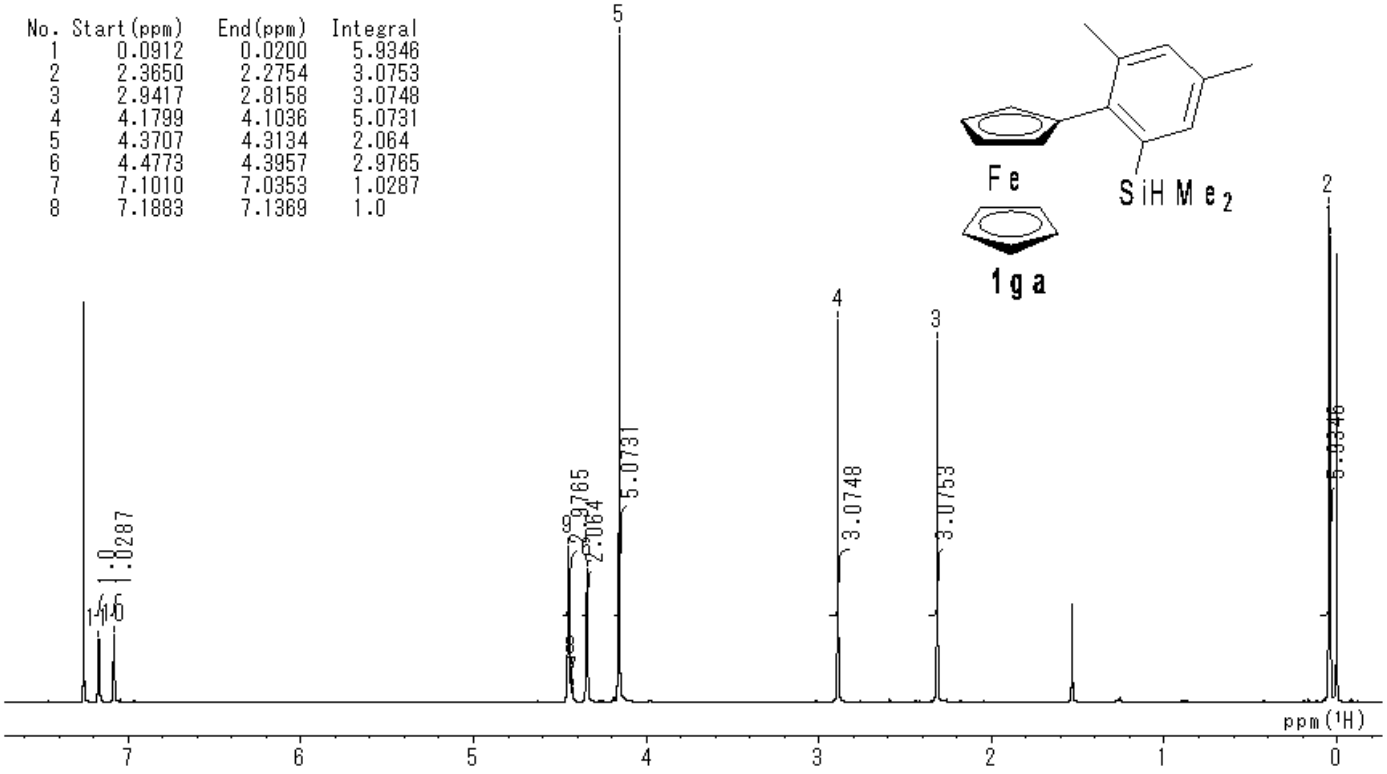


No.	δ/ppm	Height	No.	δ/ppm	Height
1	-3.27	26.36	9	121.60	2.25
2	68.00	44.30	10	123.66	0.81
3	69.52	74.41	11	126.57	11.10
4	70.55	51.73	12	132.49	20.59
5	90.14	7.67	13	139.17	6.59
6	117.47	0.59	14	143.86	9.32
7	119.54	2.41	15	147.28	3.84
8	121.15	10.56			

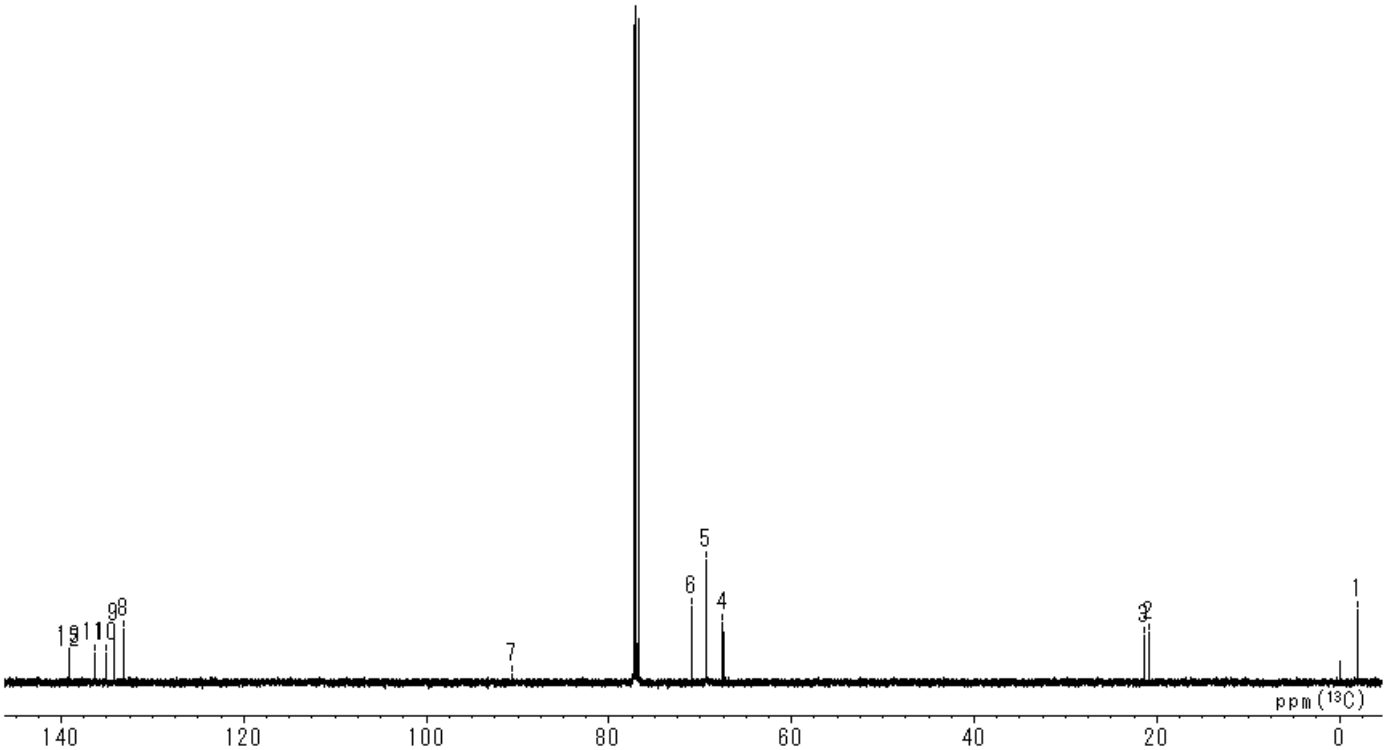


No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.04	68.85	8	4.43	5.32
2	0.04	73.51	9	4.45	23.07
3	2.31	53.35	10	7.08	9.91
4	2.89	56.58	11	7.17	9.30
5	4.16	98.64			
6	4.34	19.83			
7	4.43	2.25			

No.	Start(ppm)	End(ppm)	Integral
1	0.0912	0.0200	5.9346
2	2.3650	2.2754	3.0753
3	2.9417	2.8158	3.0748
4	4.1799	4.1036	5.0731
5	4.3707	4.3134	2.064
6	4.4773	4.3957	2.9765
7	7.1010	7.0353	1.0287
8	7.1883	7.1369	1.0



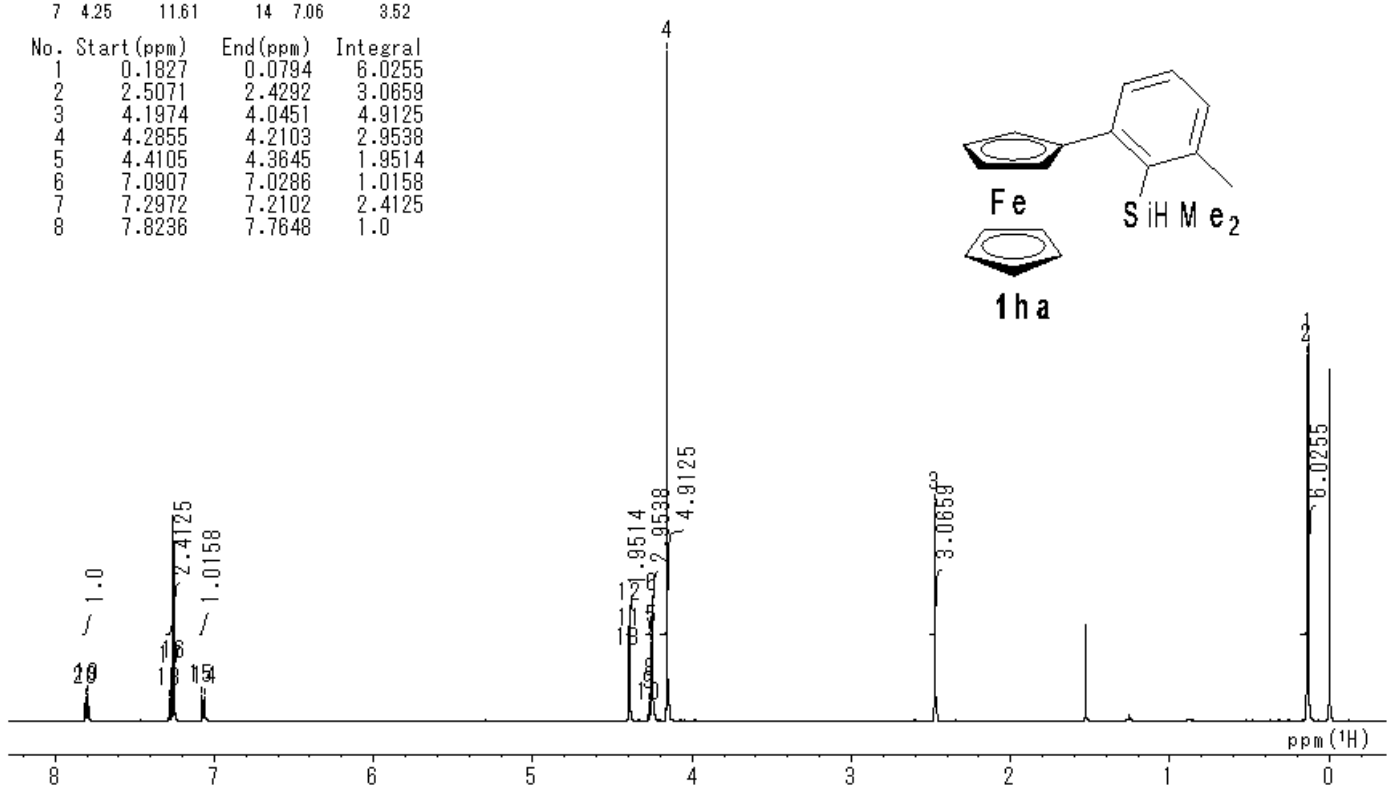
No.	δ/ppm	Height	No.	δ/ppm	Height
1	-2.03	10.76	8	133.10	7.96
2	20.90	7.42	9	134.19	7.07
3	21.43	6.91	10	135.11	4.21
4	67.51	8.89	11	136.35	4.37
5	69.35	18.12	12	139.05	3.41
6	70.90	11.12	13	139.18	3.74
7	90.64	1.11			



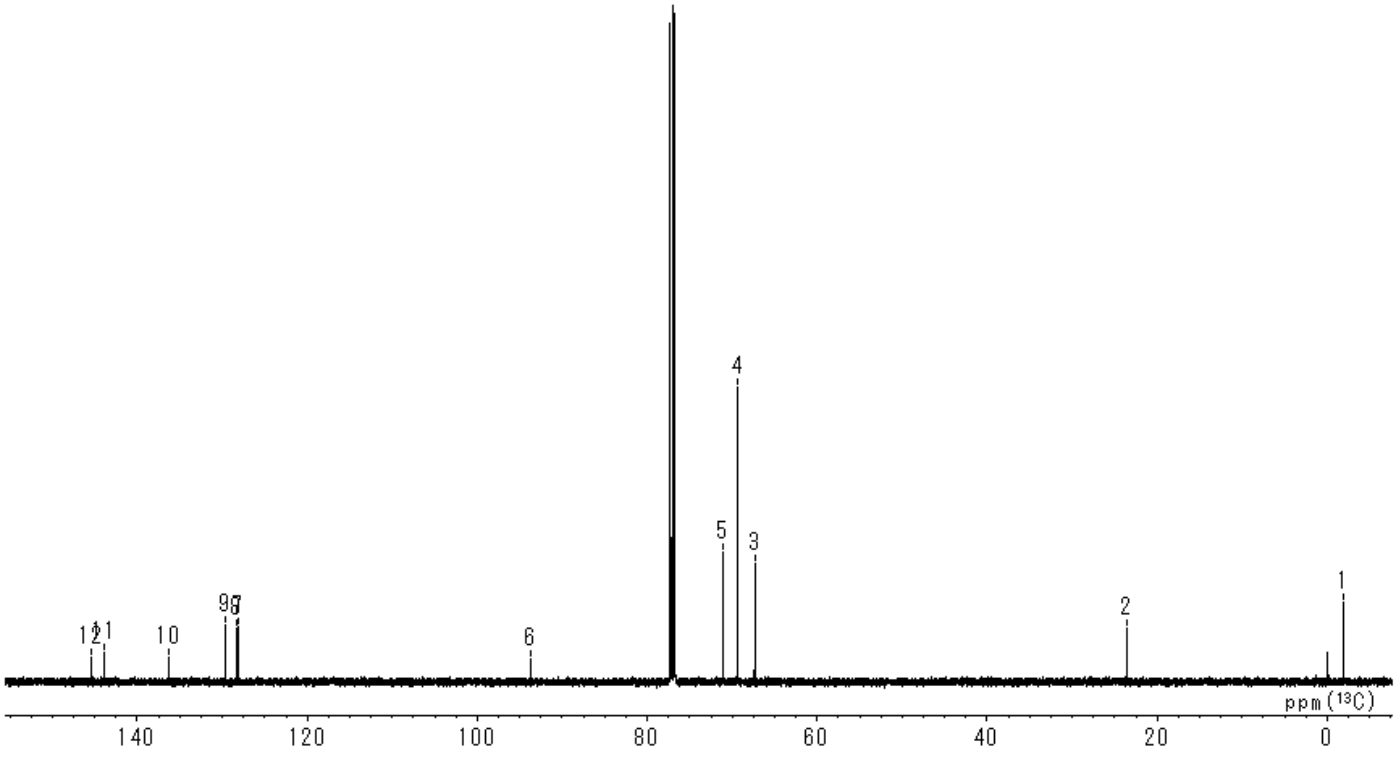
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.13	55.84	8	4.26	4.83	15	7.08	3.87
2	0.14	54.18	9	4.27	2.95	16	7.25	7.46
3	2.48	32.33	10	4.27	1.14	17	7.27	6.73
4	4.16	99.19	11	4.39	12.10	18	7.28	3.24
5	4.25	12.67	12	4.39	15.90	19	7.79	3.92
6	4.25	17.26	13	4.40	9.27	20	7.81	3.54
7	4.25	11.61	14	7.06	3.52			

No.	Start(ppm)	End(ppm)	Integral
1	0.1827	0.0794	6.0255
2	2.5071	2.4292	3.0659
3	4.1974	4.0451	4.9125
4	4.2855	4.2103	2.9538
5	4.4105	4.3645	1.9514
6	7.0907	7.0286	1.0158
7	7.2972	7.2102	2.4125
8	7.8236	7.7648	1.0

1ha

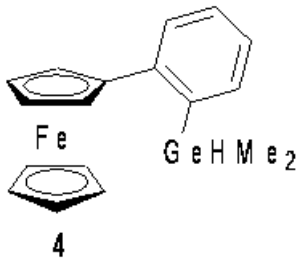


No.	δ/ppm	Height	No.	δ/ppm	Height
1	-1.91	11.57	8	128.31	7.78
2	23.55	7.94	9	129.64	8.34
3	67.36	17.42	10	136.33	3.55
4	69.42	43.15	11	143.95	4.25
5	71.09	19.07	12	145.42	3.62
6	93.74	3.33			
7	128.12	8.12			

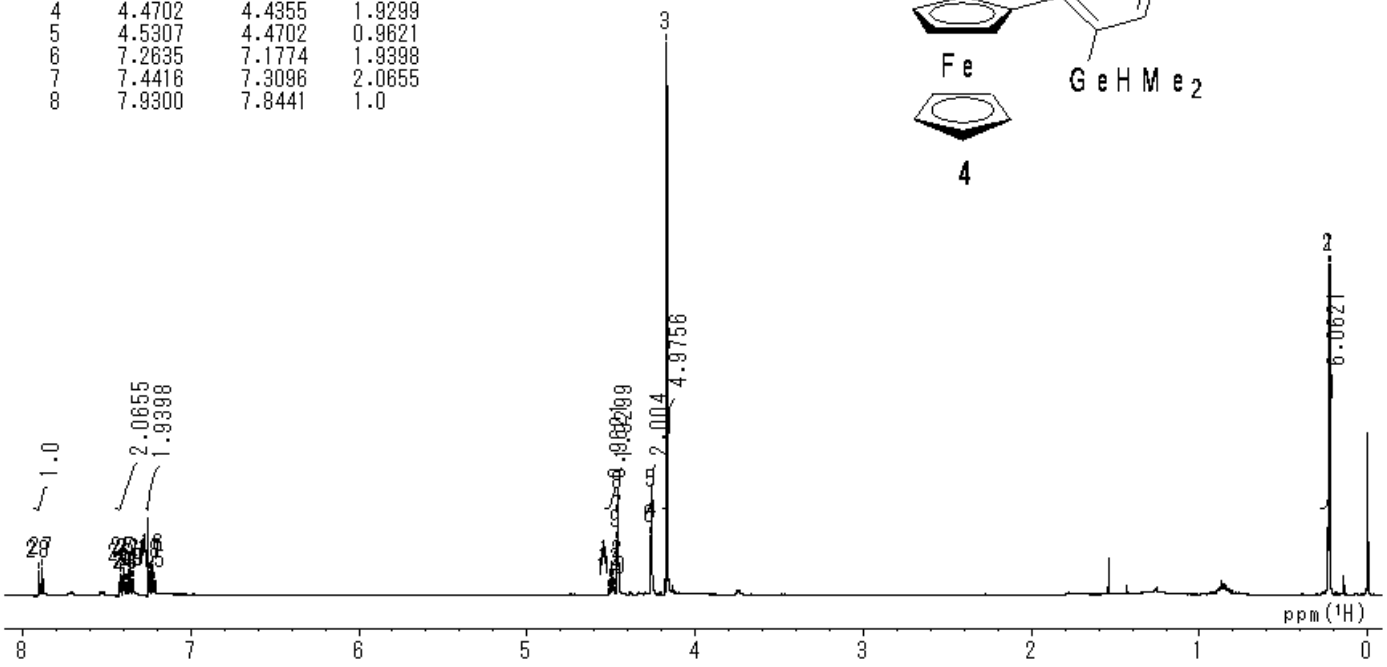


No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.23	59.29	8	4.46	16.81	15	7.21	2.53	22	7.37	4.56
2	0.23	59.35	9	4.47	9.78	16	7.23	5.49	23	7.38	2.43
3	4.17	98.86	10	4.48	1.35	17	7.23	4.66	24	7.39	2.32
4	4.26	11.52	11	4.49	3.20	18	7.25	4.22	25	7.40	4.96
5	4.26	16.91	12	4.49	4.23	19	7.34	2.99	26	7.42	3.81
6	4.27	10.77	13	4.50	3.01	20	7.35	3.02	27	7.88	4.77
7	4.46	12.50	14	4.51	1.04	21	7.36	4.61	28	7.90	4.26

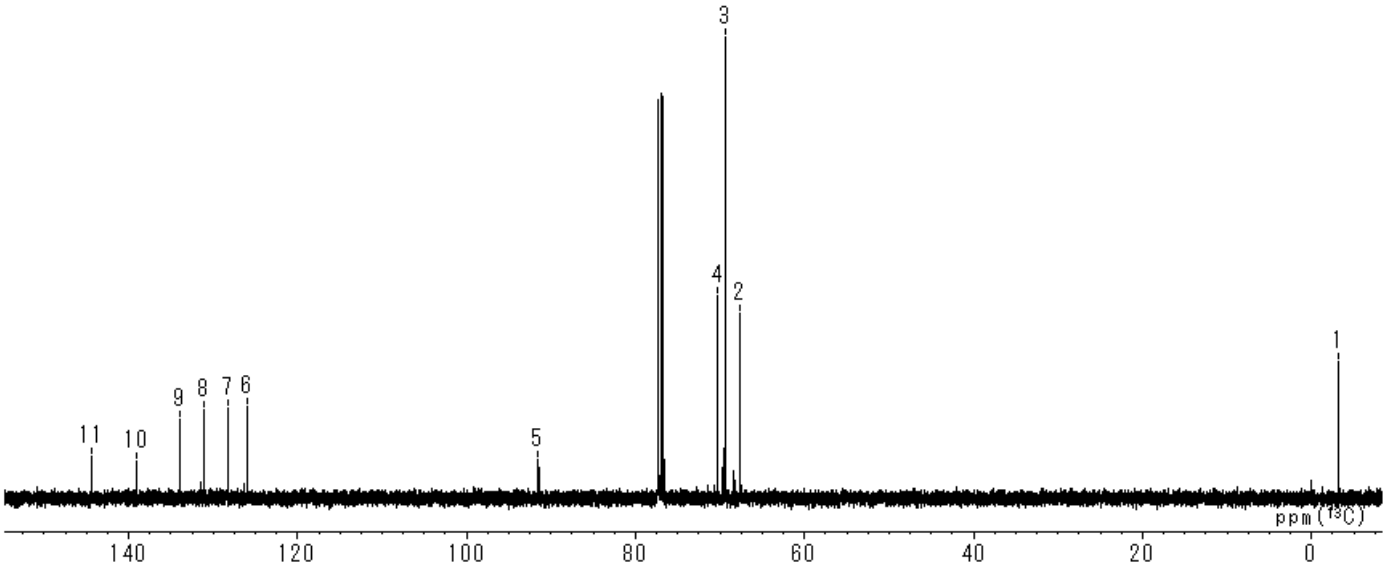
No.	Start(ppm)	End(ppm)	Integral
1	0.2776	0.2003	6.0621
2	4.1897	4.1158	4.9756
3	4.2763	4.2343	2.004
4	4.4702	4.4355	1.9299
5	4.5307	4.4702	0.9621
6	7.2635	7.1774	1.9398
7	7.4416	7.3096	2.0655
8	7.9300	7.8441	1.0



4



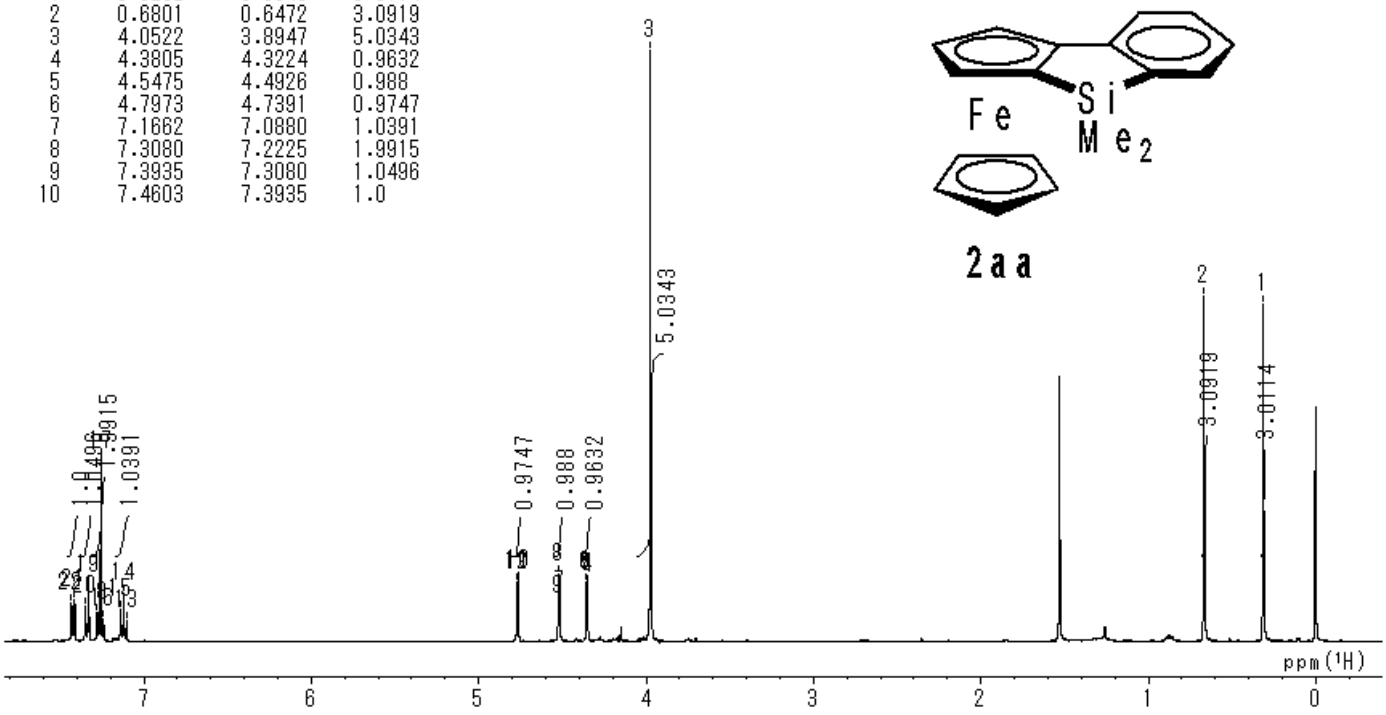
No.	δ/ppm	Height	No.	δ/ppm	Height
1	-3.12	29.53	8	131.02	19.00
2	67.71	40.10	9	134.00	16.93
3	69.44	99.99	10	139.07	7.98
4	70.36	43.85	11	144.40	9.09
5	91.49	8.29			
6	125.87	19.68			
7	128.26	19.32			



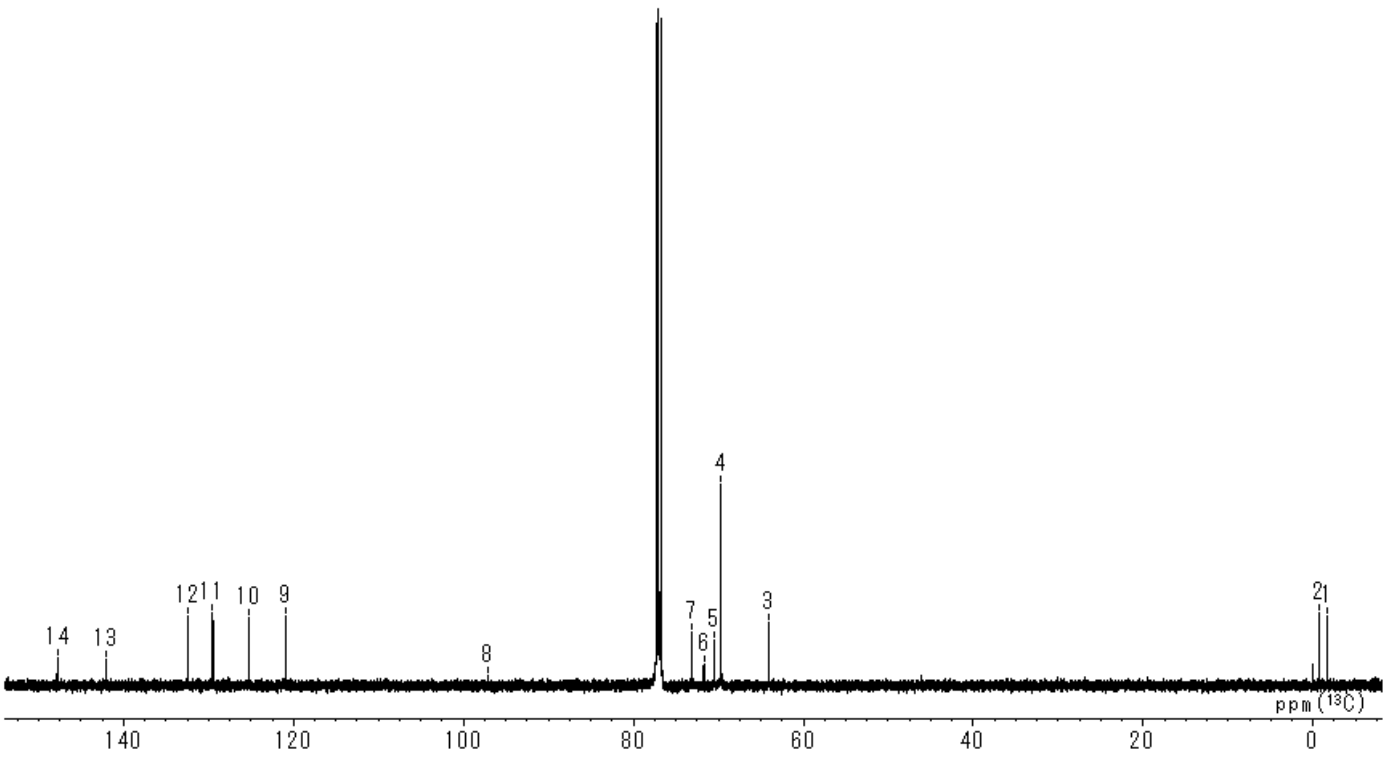
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.31	55.09	8	4.52	11.33	15	7.14	5.51	22	7.43	6.45
2	0.67	56.38	9	4.53	6.09	16	7.24	3.99			
3	3.98	96.54	10	4.76	10.08	17	7.26	29.41			
4	4.35	9.35	11	4.77	9.83	18	7.28	5.05			
5	4.35	9.63	12	4.77	9.96	19	7.33	9.38			
6	4.36	10.06	13	7.10	3.73	20	7.35	5.97			
7	4.51	6.74	14	7.12	8.19	21	7.42	7.11			

No.	Start(ppm)	End(ppm)	Integral
1	0.3262	0.3046	3.0114
2	0.6801	0.6472	3.0919
3	4.0522	3.8947	5.0343
4	4.3805	4.3224	0.9632
5	4.5475	4.4926	0.988
6	4.7973	4.7391	0.9747
7	7.1662	7.0880	1.0391
8	7.3080	7.2225	1.9915
9	7.3935	7.3080	1.0496
10	7.4603	7.3935	1.0

2aa



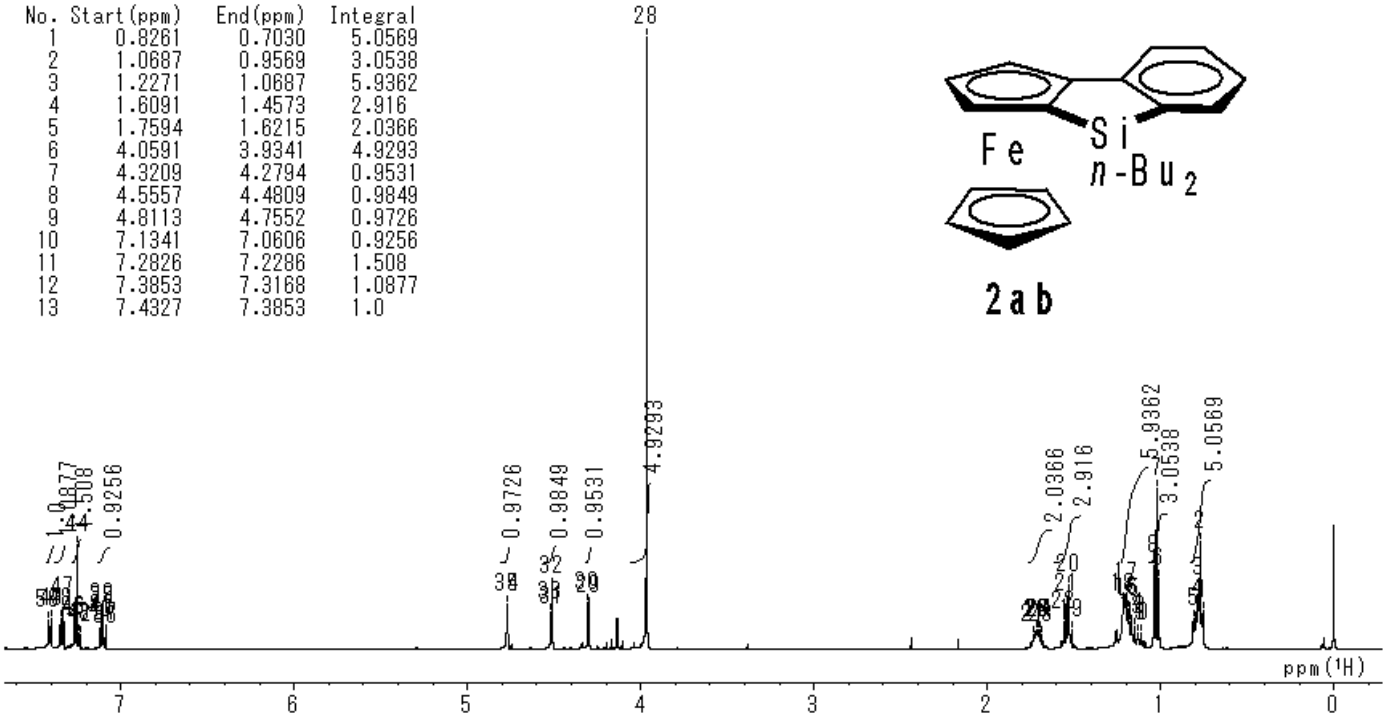
No.	δ/ppm	Height	No.	δ/ppm	Height
1	-1.61	10.20	8	97.03	1.51
2	-0.76	10.59	9	120.91	10.21
3	64.04	9.18	10	125.24	9.94
4	69.68	29.66	11	129.50	10.80
5	70.51	6.76	12	132.43	10.30
6	71.71	3.06	13	142.11	3.77
7	73.19	7.75	14	147.81	4.00



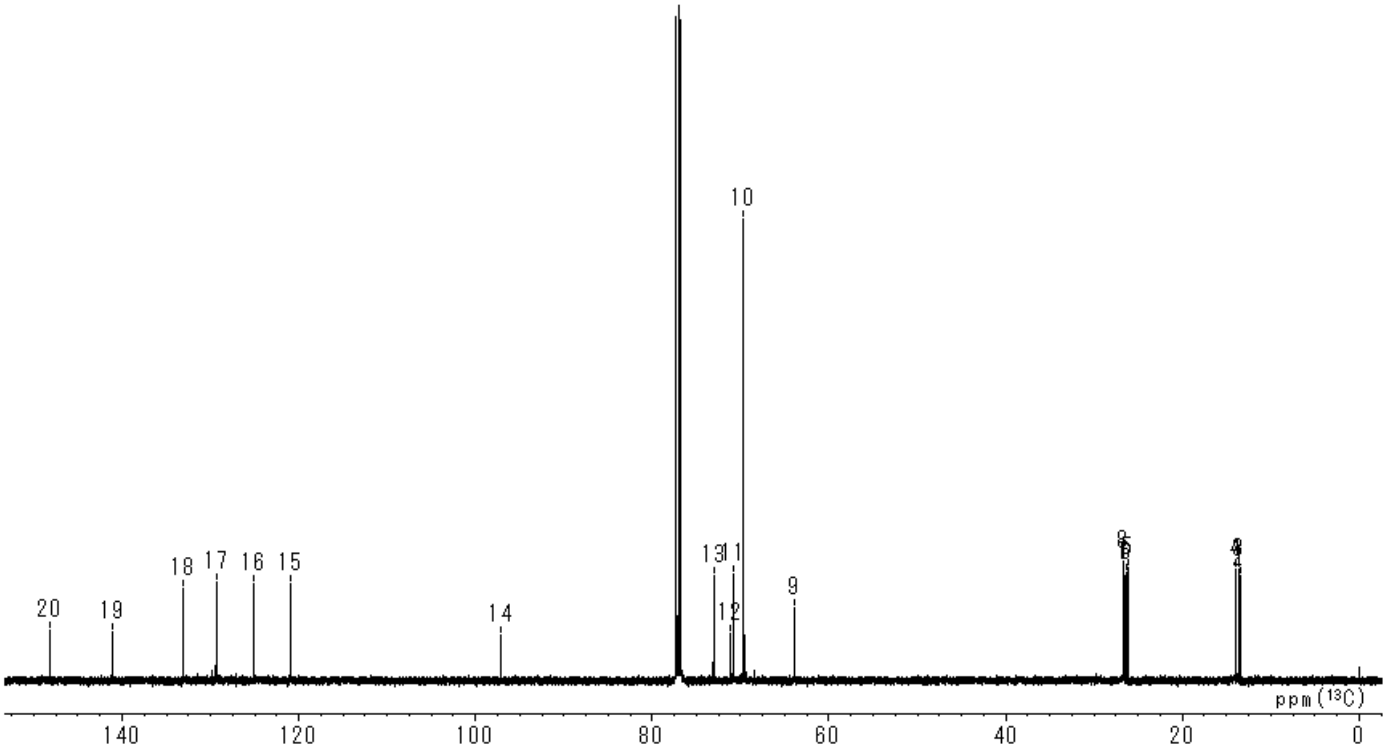
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.76	6.17	10	1.13	2.54	19	1.51	3.19	28	3.97	99.55	37	7.09	2.56	46	7.27	3.58
2	0.77	17.42	11	1.13	2.73	20	1.53	10.54	29	4.30	7.03	38	7.10	5.16	47	7.33	6.80
3	0.78	9.93	12	1.15	3.67	21	1.54	7.35	30	4.30	7.59	39	7.10	5.72	48	7.35	5.04
4	0.79	6.40	13	1.17	3.63	22	1.56	4.38	31	4.51	5.21	40	7.12	3.27	49	7.40	5.06
5	0.81	5.03	14	1.17	4.10	23	1.69	2.24	32	4.51	10.18	41	7.12	3.66	50	7.42	4.82
6	1.01	11.63	15	1.18	6.46	24	1.70	3.15	33	4.52	5.97	42	7.24	2.35			
7	1.02	26.07	16	1.19	6.73	25	1.71	3.10	34	4.77	7.26	43	7.24	2.74			
8	1.04	13.53	17	1.20	9.04	26	1.72	3.23	35	4.77	7.36	44	7.25	16.87			
9	1.11	2.71	18	1.21	7.28	27	1.73	2.24	36	7.09	2.19	45	7.27	3.35			

No.	Start(ppm)	End(ppm)	Integral
1	0.8261	0.7030	5.0569
2	1.0687	0.9569	3.0538
3	1.2271	1.0687	5.9362
4	1.6091	1.4573	2.916
5	1.7594	1.6215	2.0366
6	4.0591	3.9341	4.9293
7	4.3209	4.2794	0.9531
8	4.5557	4.4809	0.9849
9	4.8113	4.7552	0.9726
10	7.1341	7.0606	0.9256
11	7.2826	7.2286	1.508
12	7.3853	7.3168	1.0877
13	7.4327	7.3853	1.0

2ab



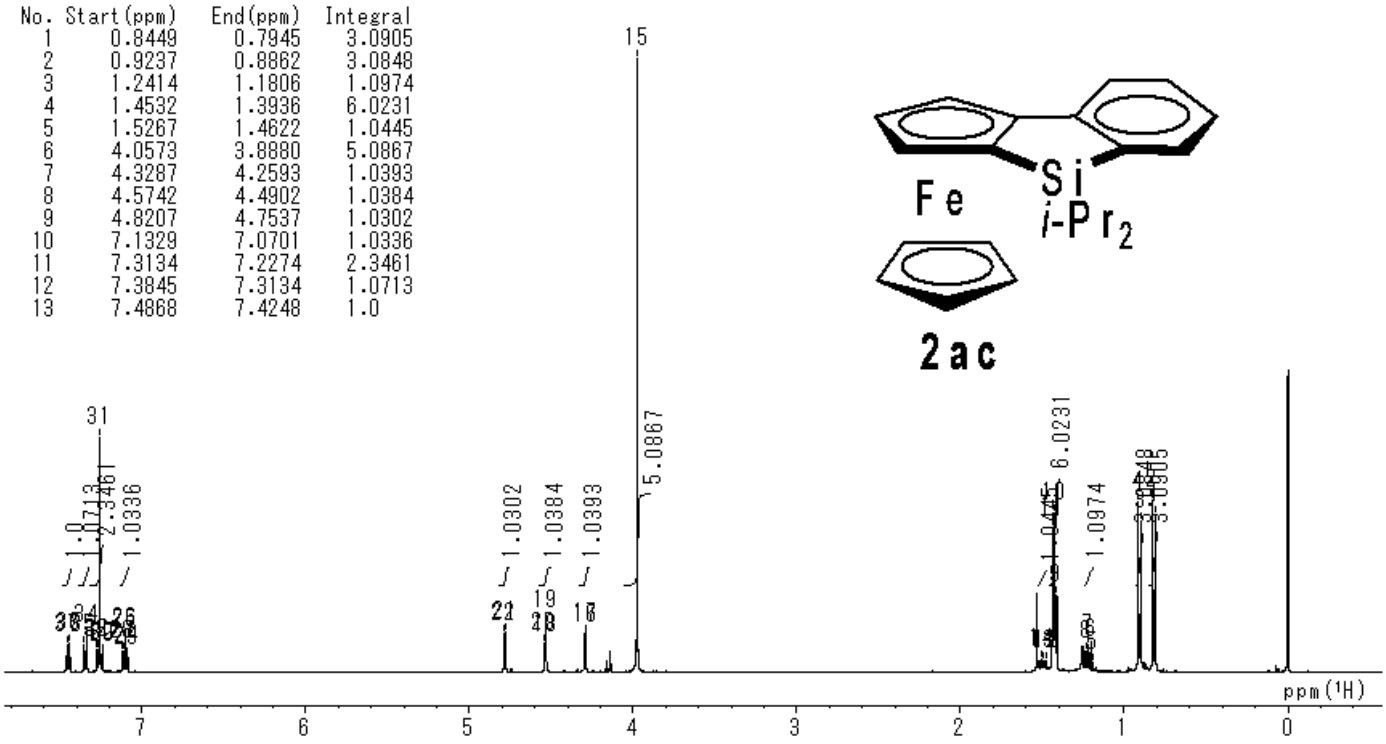
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	13.35	15.55	8	26.70	17.62	15	120.96	14.23
2	13.52	14.86	9	63.86	10.60	16	125.04	14.33
3	13.66	16.32	10	69.64	68.20	17	129.37	14.57
4	13.99	16.44	11	70.87	15.79	18	133.08	13.59
5	26.17	16.62	12	71.22	6.87	19	141.03	7.02
6	26.27	15.95	13	73.06	15.33	20	148.19	7.35
7	26.58	15.90	14	97.11	6.70			



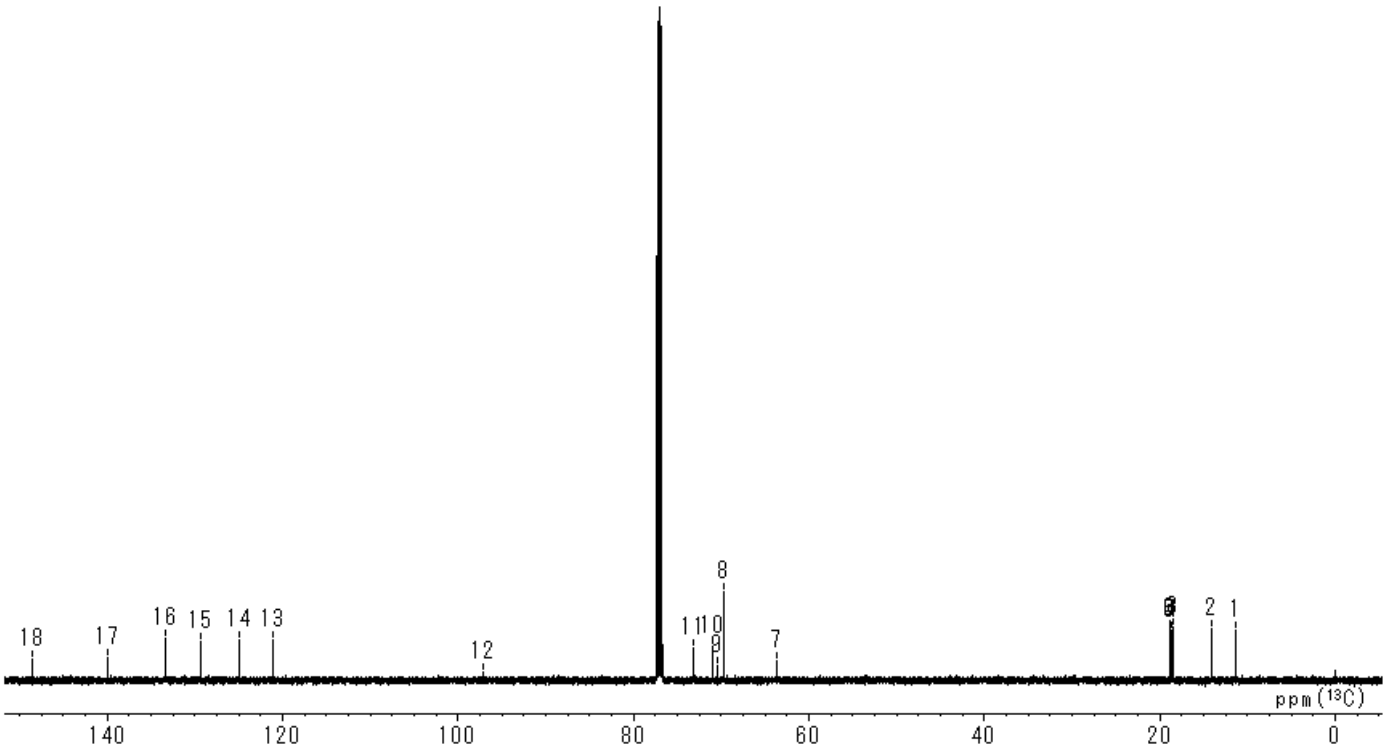
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.81	25.69	8	1.24	3.33	15	3.98	99.97	22	4.78	6.39	29	7.24	2.79	36	7.44	4.73
2	0.82	28.09	9	1.41	12.67	16	4.29	6.00	23	7.09	2.47	30	7.24	3.05	37	7.46	4.37
3	0.90	24.50	10	1.43	25.86	17	4.29	6.35	24	7.09	2.69	31	7.26	38.11			
4	0.91	27.81	11	1.44	23.55	18	4.53	4.50	25	7.10	5.32	32	7.27	3.57			
5	1.19	1.66	12	1.48	1.81	19	4.53	8.44	26	7.10	5.58	33	7.27	3.55			
6	1.21	3.61	13	1.49	1.90	20	4.54	4.79	27	7.12	3.34	34	7.34	5.92			
7	1.22	4.45	14	1.51	1.98	21	4.78	6.51	28	7.12	3.50	35	7.35	4.33			

No.	Start(ppm)	End(ppm)	Integral
1	0.8449	0.7945	3.0905
2	0.9237	0.8862	3.0848
3	1.2414	1.1806	1.0974
4	1.4532	1.3936	6.0231
5	1.5267	1.4622	1.0445
6	4.0573	3.8880	5.0867
7	4.3287	4.2593	1.0393
8	4.5742	4.4902	1.0384
9	4.8207	4.7537	1.0302
10	7.1329	7.0701	1.0336
11	7.3134	7.2274	2.3461
12	7.3845	7.3134	1.0713
13	7.4868	7.4248	1.0

2ac



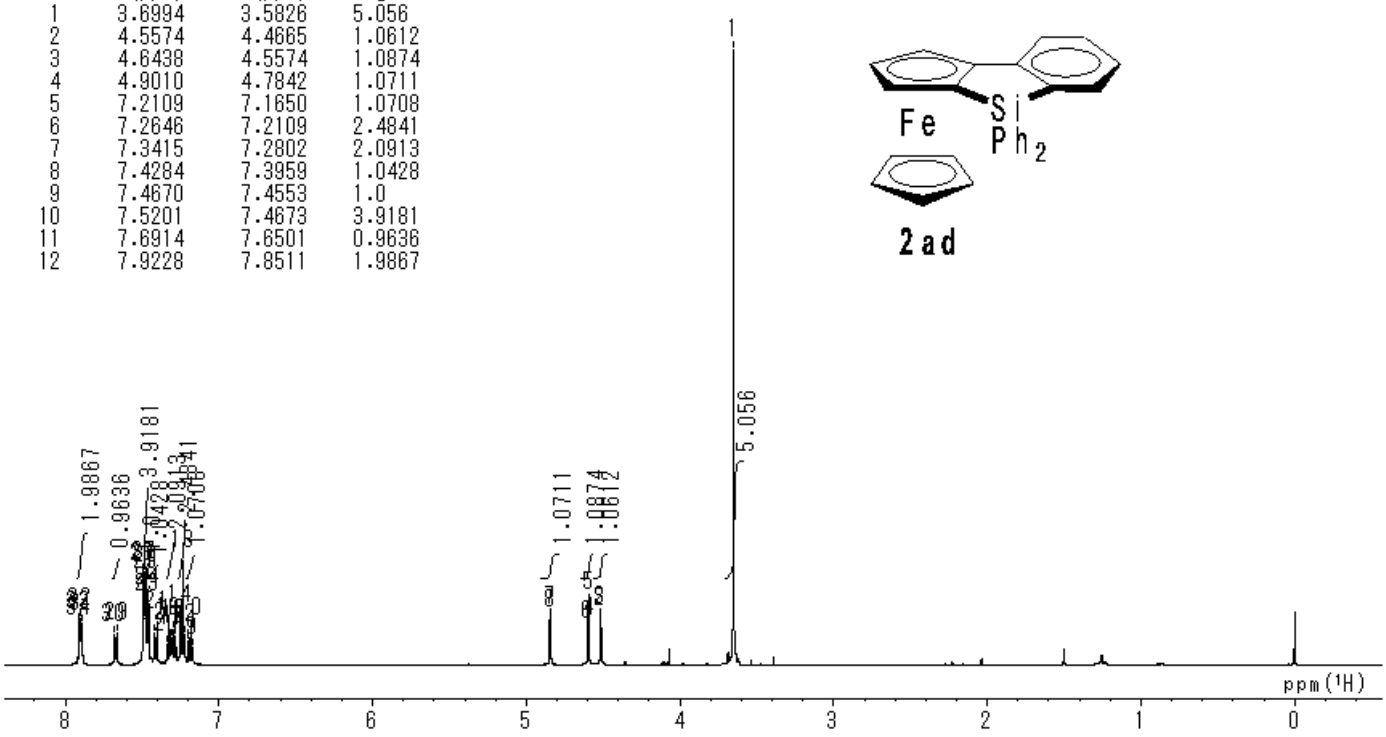
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	11.26	7.37	8	69.71	13.17	15	129.33	5.69
2	14.03	7.67	9	70.45	2.05	16	133.42	6.16
3	18.41	7.87	10	70.96	4.92	17	139.89	3.25
4	18.70	7.25	11	73.09	4.69	18	148.53	3.03
5	18.77	7.30	12	97.21	1.21			
6	18.88	7.51	13	121.05	5.92			
7	63.73	2.78	14	124.97	5.90			



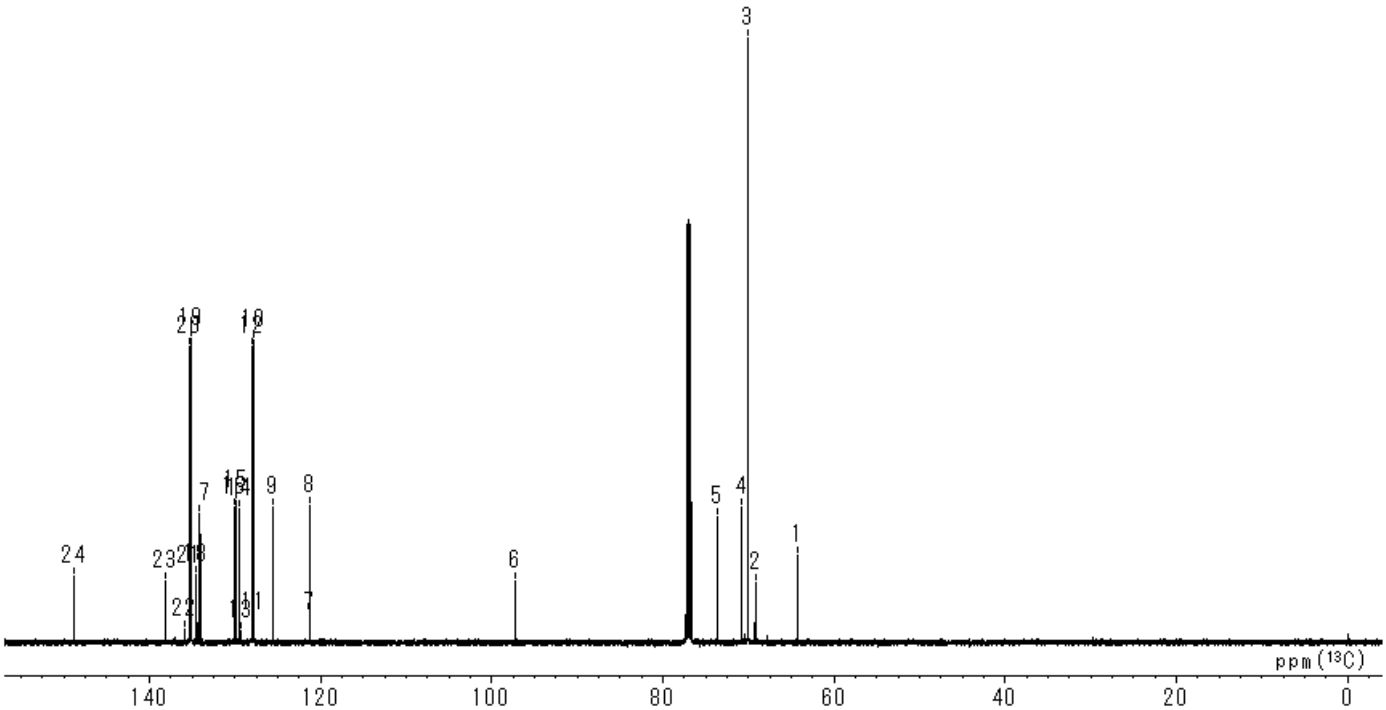
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	3.65	100.00	8	4.85	7.30	15	7.28	4.72	22	7.42	5.24	29	7.67	5.31
2	4.51	7.50	9	7.17	2.99	16	7.30	5.74	23	7.46	10.06	30	7.68	4.88
3	4.52	7.80	10	7.18	6.04	17	7.31	4.36	24	7.46	11.05	31	7.89	6.74
4	4.59	5.92	11	7.20	3.79	18	7.32	5.96	25	7.47	13.63	32	7.90	7.68
5	4.60	10.18	12	7.22	4.89	19	7.32	6.08	26	7.48	14.54	33	7.91	7.14
6	4.60	5.38	13	7.24	17.08	20	7.34	3.39	27	7.49	15.05	34	7.91	5.91
7	4.84	7.96	14	7.25	7.98	21	7.40	7.12	28	7.49	14.99			

No.	Start(ppm)	End(ppm)	Integral
1	3.6994	3.5826	5.056
2	4.5574	4.4665	1.0612
3	4.6438	4.5574	1.0874
4	4.9010	4.7842	1.0711
5	7.2109	7.1650	1.0708
6	7.2646	7.2109	2.4841
7	7.3415	7.2802	2.0913
8	7.4284	7.3959	1.0428
9	7.4670	7.4553	1.0
10	7.5201	7.4673	3.9181
11	7.6914	7.6501	0.9636
12	7.9228	7.8511	1.9867

2ad



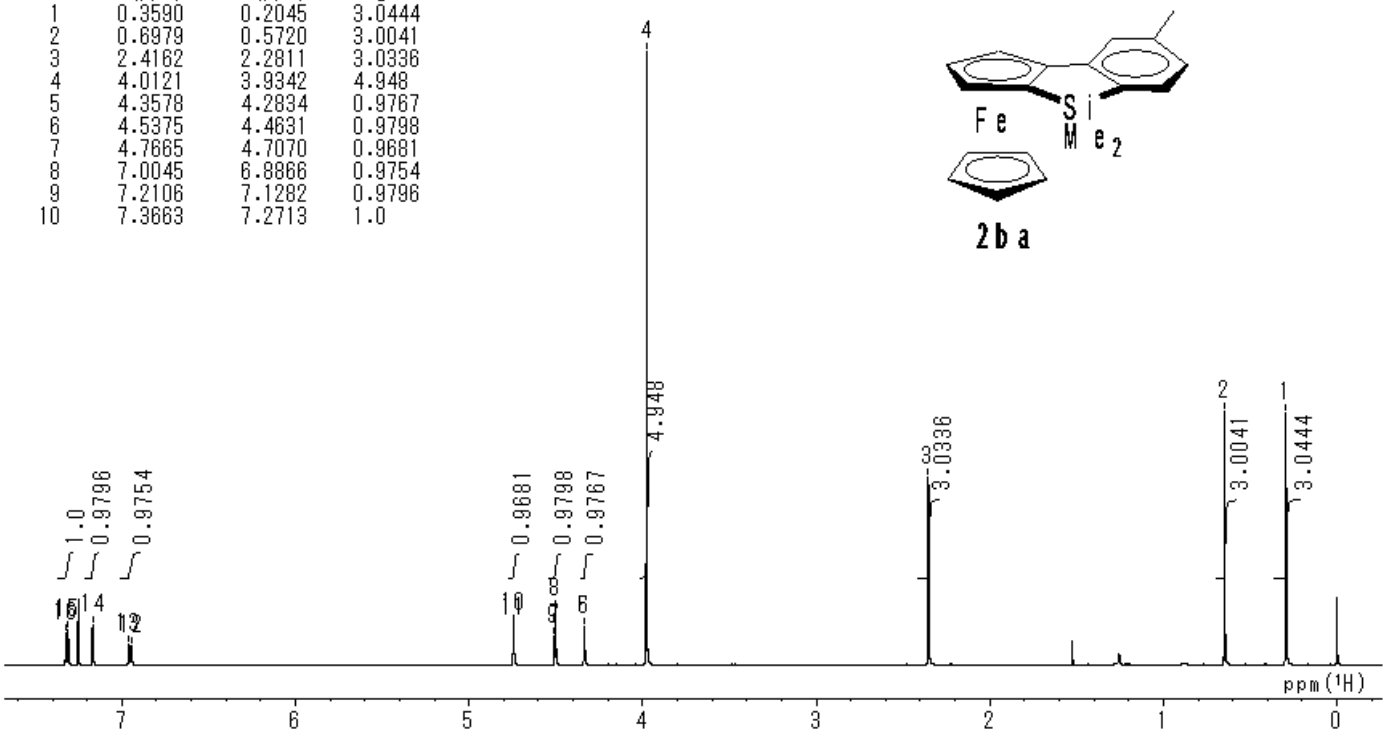
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	64.32	14.15	8	121.30	22.24	15	129.93	22.88	22	135.83	2.20
2	69.08	9.66	9	125.58	21.84	16	130.11	21.94	23	138.12	10.04
3	70.10	98.23	10	127.81	49.25	17	134.13	20.90	24	148.86	10.61
4	70.81	22.06	11	127.85	3.13	18	134.50	10.89			
5	73.68	20.32	12	128.06	48.16	19	135.10	49.36			
6	97.31	10.01	13	129.43	1.89	20	135.25	48.10			
7	121.29	3.15	14	129.56	21.82	21	135.31	10.80			



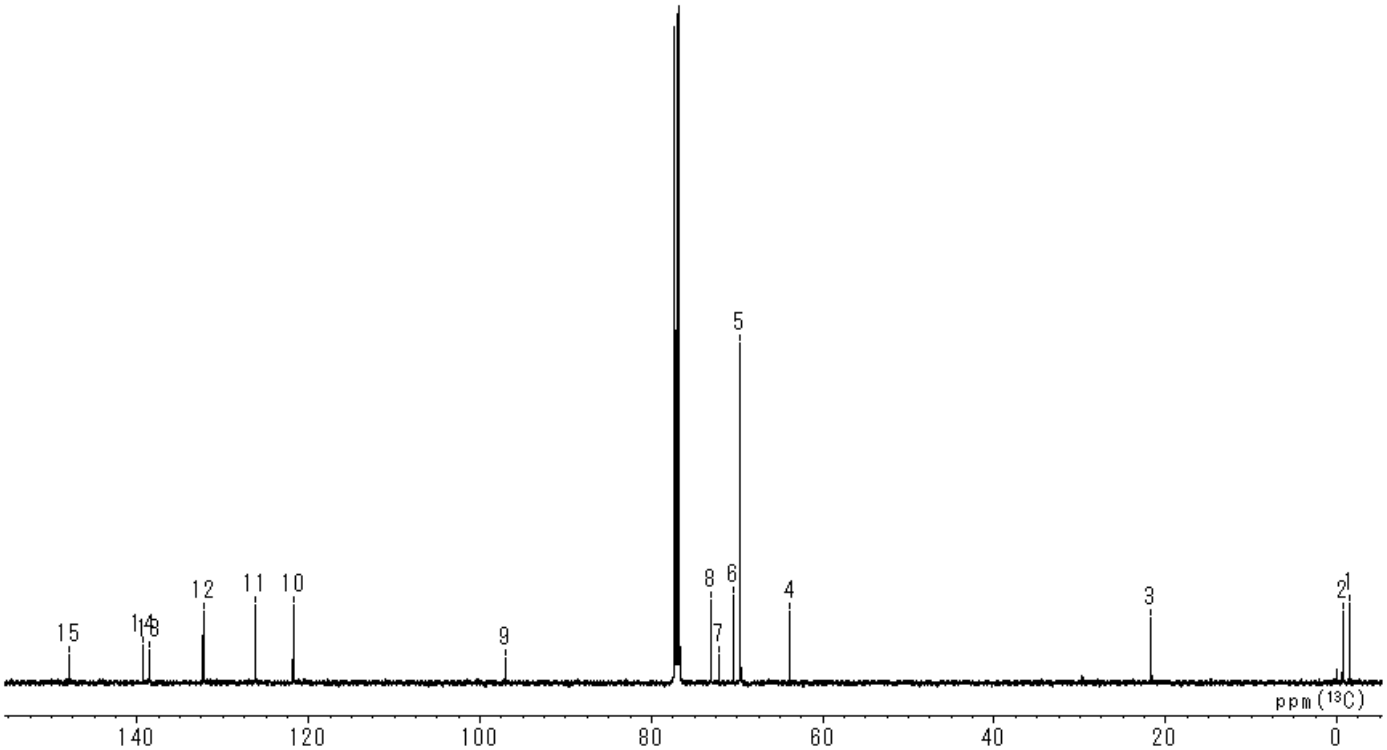
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.29	40.98	8	4.50	9.05	15	7.31	5.81
2	0.65	41.17	9	4.51	4.70	16	7.32	5.35
3	2.35	30.54	10	4.74	6.75			
4	3.98	99.78	11	4.75	6.00			
5	4.33	6.34	12	6.94	3.13			
6	4.34	6.21	13	6.96	3.43			
7	4.50	5.00	14	7.17	6.51			

No.	Start(ppm)	End(ppm)	Integral
1	0.3590	0.2045	3.0444
2	0.6979	0.5720	3.0041
3	2.4162	2.2811	3.0336
4	4.0121	3.9342	4.948
5	4.3578	4.2834	0.9767
6	4.5375	4.4631	0.9798
7	4.7665	4.7070	0.9681
8	7.0045	6.8866	0.9754
9	7.2106	7.1282	0.9796
10	7.3663	7.2713	1.0

2ba

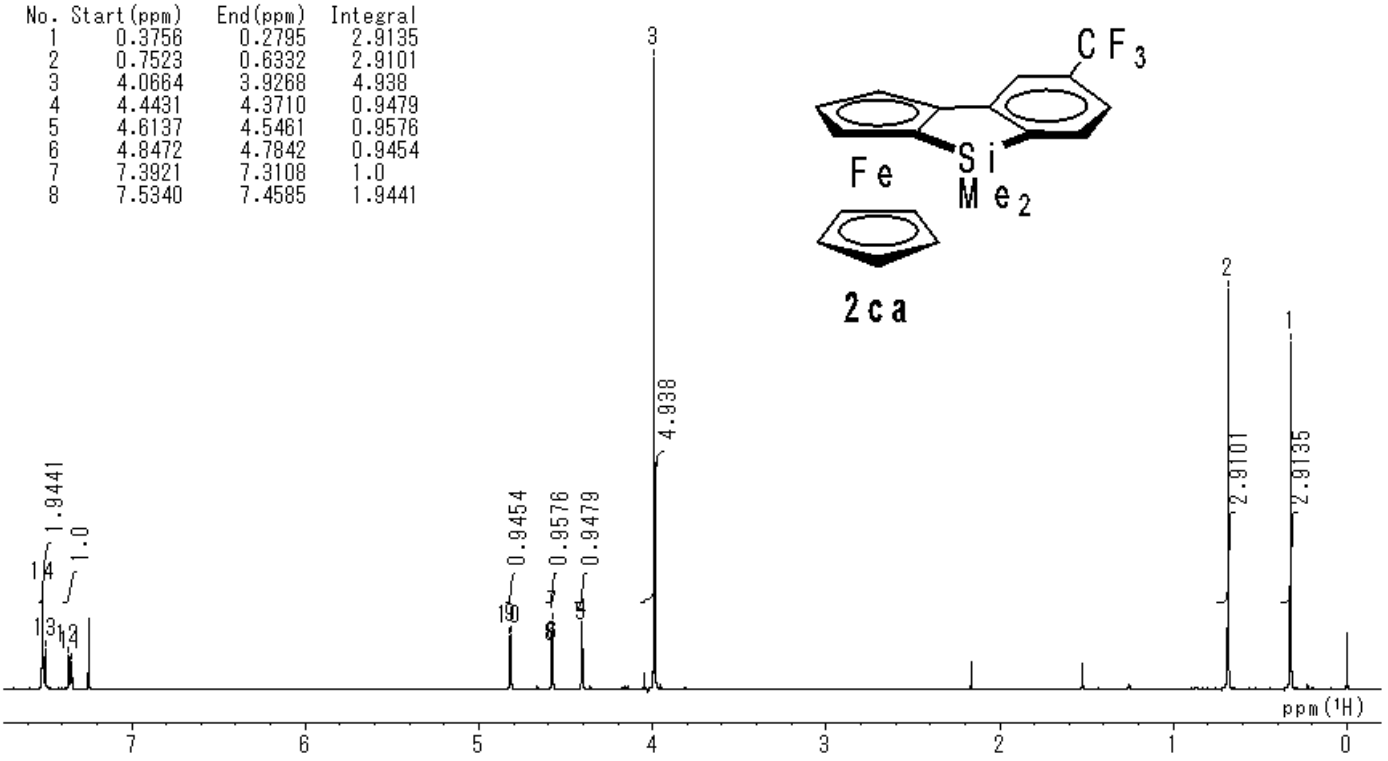


No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	-1.52	11.60	8	73.04	12.20	15	148.01	4.05
2	-0.66	10.56	9	97.07	3.55			
3	21.68	9.41	10	121.81	11.47			
4	63.88	10.34	11	126.21	11.33			
5	69.64	50.12	12	132.30	10.50			
6	70.42	12.88	13	138.58	4.73			
7	72.10	3.96	14	139.31	5.41			

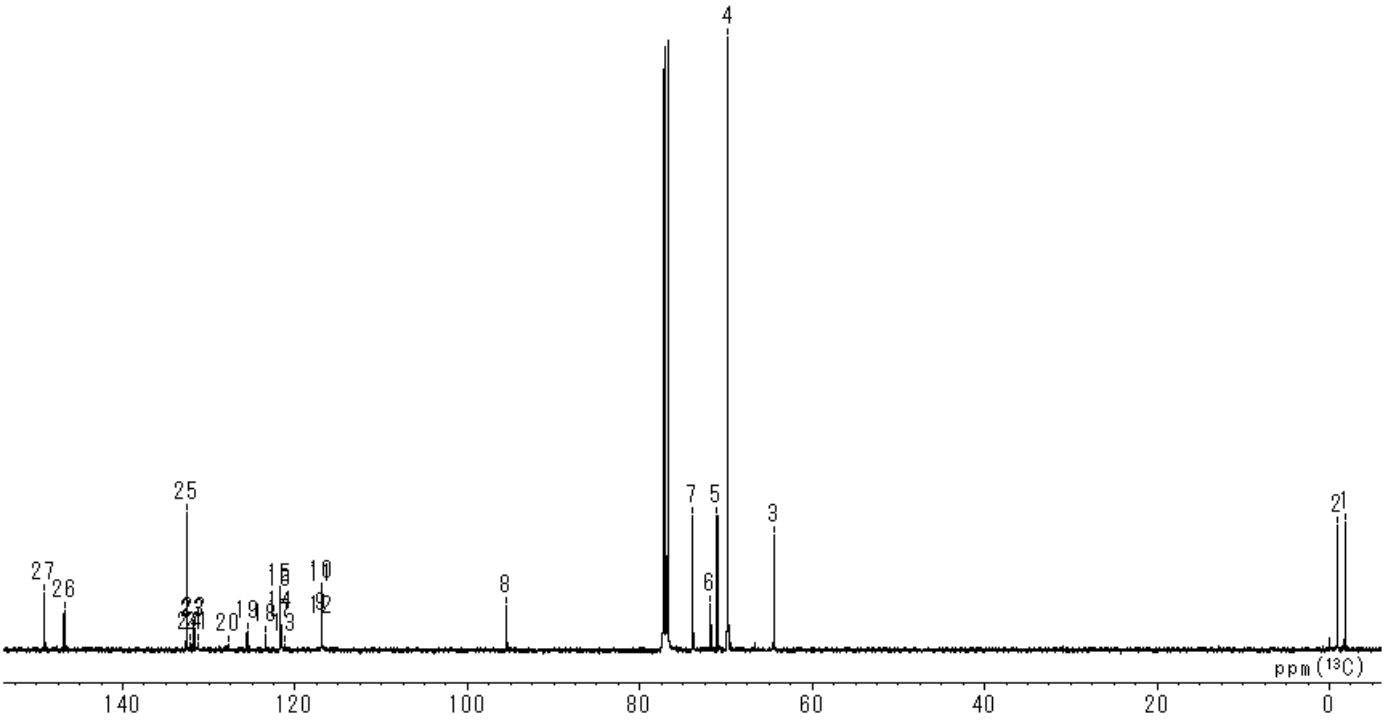


No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.33	46.70	8	4.58	4.74
2	0.69	53.80	9	4.82	7.25
3	3.99	84.82	10	4.82	7.03
4	4.41	8.00	11	7.35	3.69
5	4.41	7.67	12	7.36	4.50
6	4.57	5.00	13	7.50	5.49
7	4.58	8.97	14	7.51	12.91

No.	Start(ppm)	End(ppm)	Integral
1	0.3756	0.2795	2.9135
2	0.7523	0.6332	2.9101
3	4.0664	3.9268	4.938
4	4.4431	4.3710	0.9479
5	4.6137	4.5461	0.9576
6	4.8472	4.7842	0.9454
7	7.3921	7.3108	1.0
8	7.5340	7.4585	1.9441

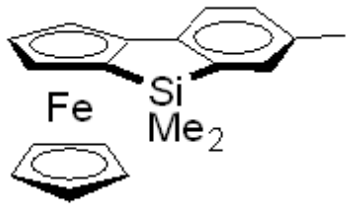


No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	-1.81	20.74	8	95.43	7.11	15	121.69	8.95	22	131.58	3.31
2	-0.95	20.21	9	116.87	4.29	16	121.72	8.01	23	131.83	3.18
3	64.45	18.47	10	116.89	9.48	17	121.76	3.17	24	132.09	0.99
4	69.84	99.67	11	116.92	8.97	18	123.38	2.44	25	132.61	22.19
5	71.02	21.78	12	116.95	3.79	19	125.57	2.79	26	146.79	6.16
6	71.78	7.36	13	121.20	0.89	20	127.76	0.66	27	149.06	9.20
7	73.85	21.62	14	121.67	4.32	21	131.33	1.06			



No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.30	54.52	8	4.49	10.61	15	7.24	16.61
2	0.66	53.80	9	4.50	5.52			
3	2.31	50.49	10	4.72	10.88			
4	3.97	96.44	11	4.73	9.56			
5	4.32	10.37	12	7.06	5.53			
6	4.33	9.50	13	7.08	6.78			
7	4.49	7.45	14	7.23	10.80			

No.	Start(ppm)	End(ppm)	Integral
1	0.3101	0.2981	3.0113
2	0.6588	0.6474	3.0124
3	2.3171	2.3066	3.024
4	3.9803	3.9429	5.0
5	4.3325	4.3153	0.9994
6	4.5029	4.4839	1.0133
7	4.7390	4.7188	1.006
8	7.0820	7.0576	1.0065
9	7.2451	7.2253	2.0169



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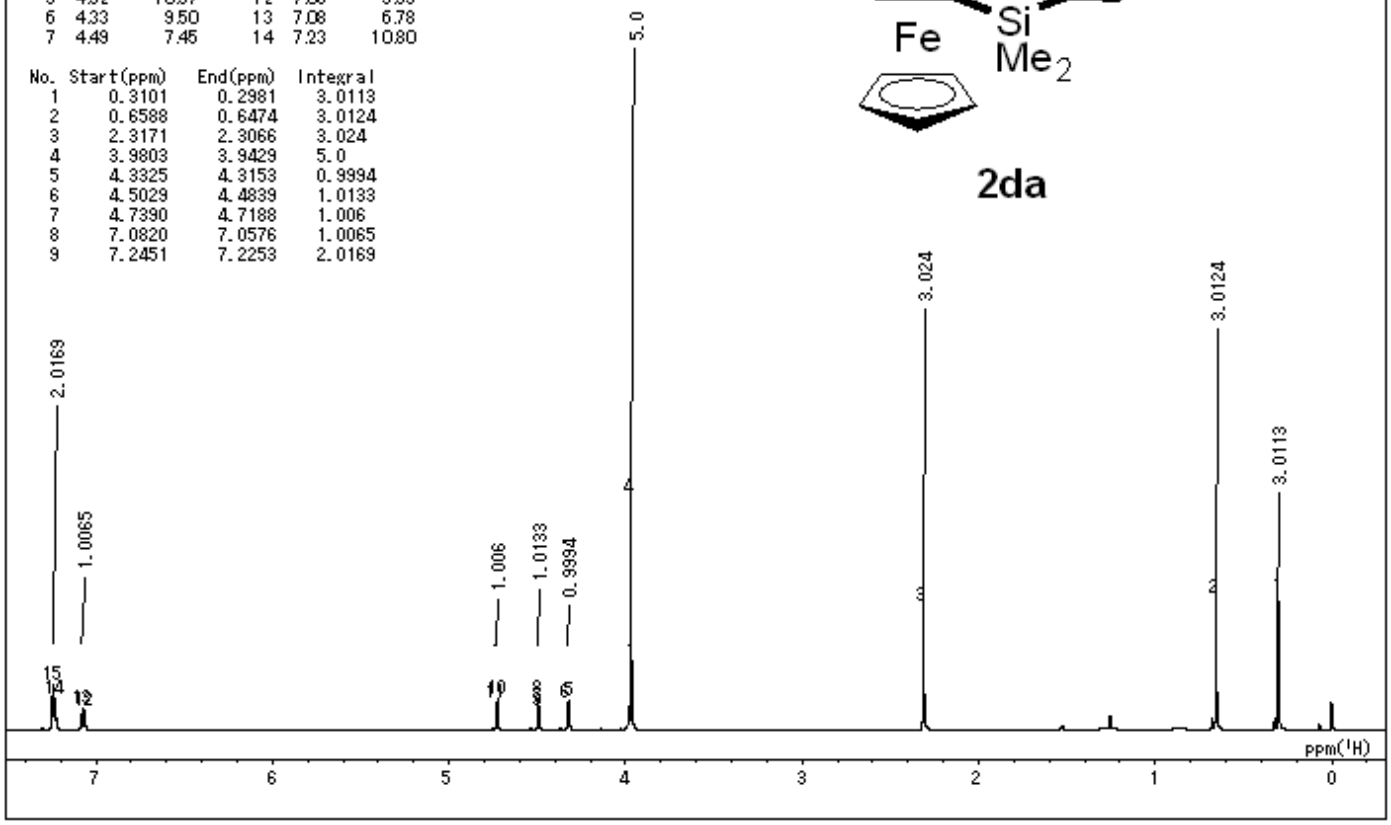
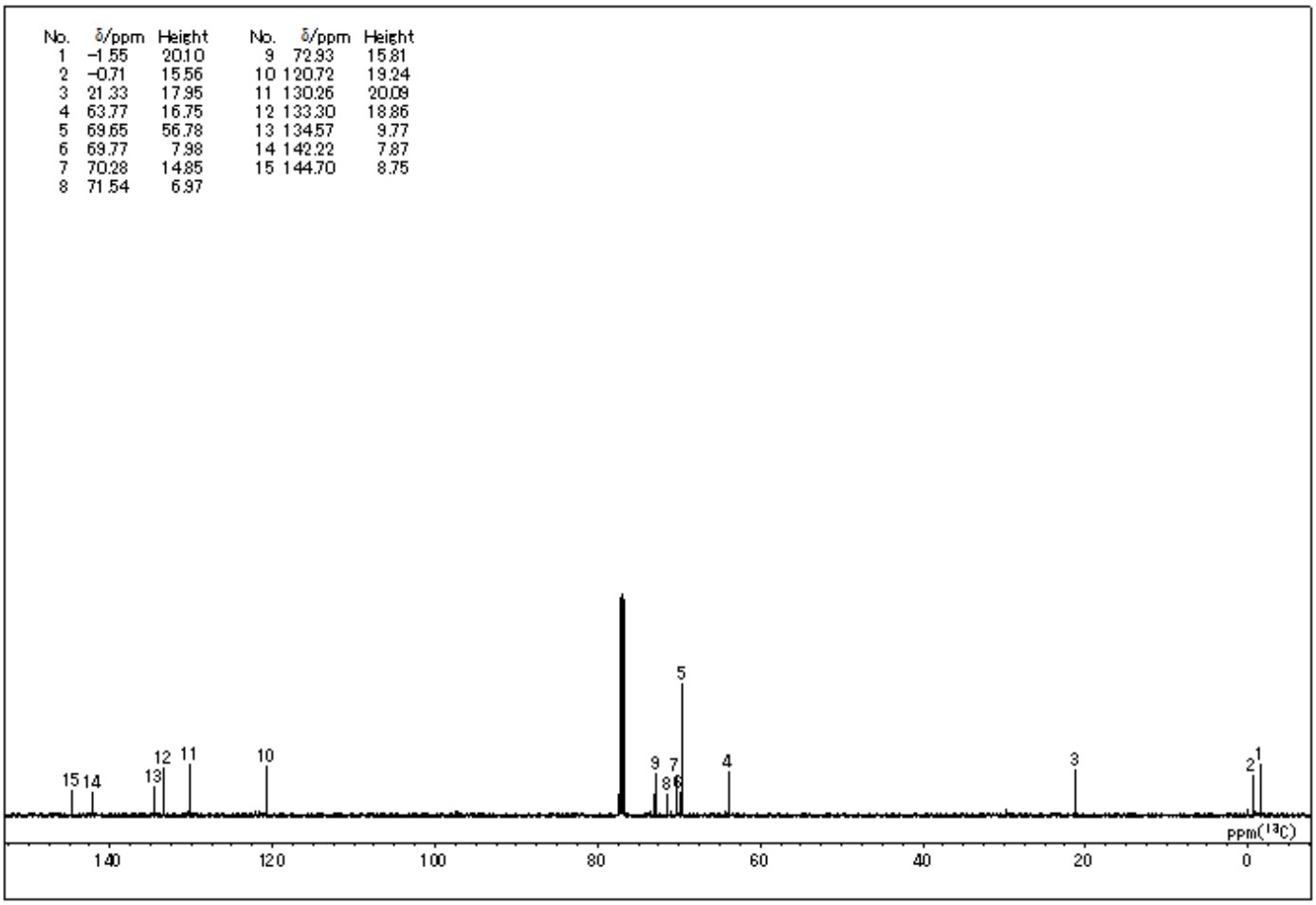
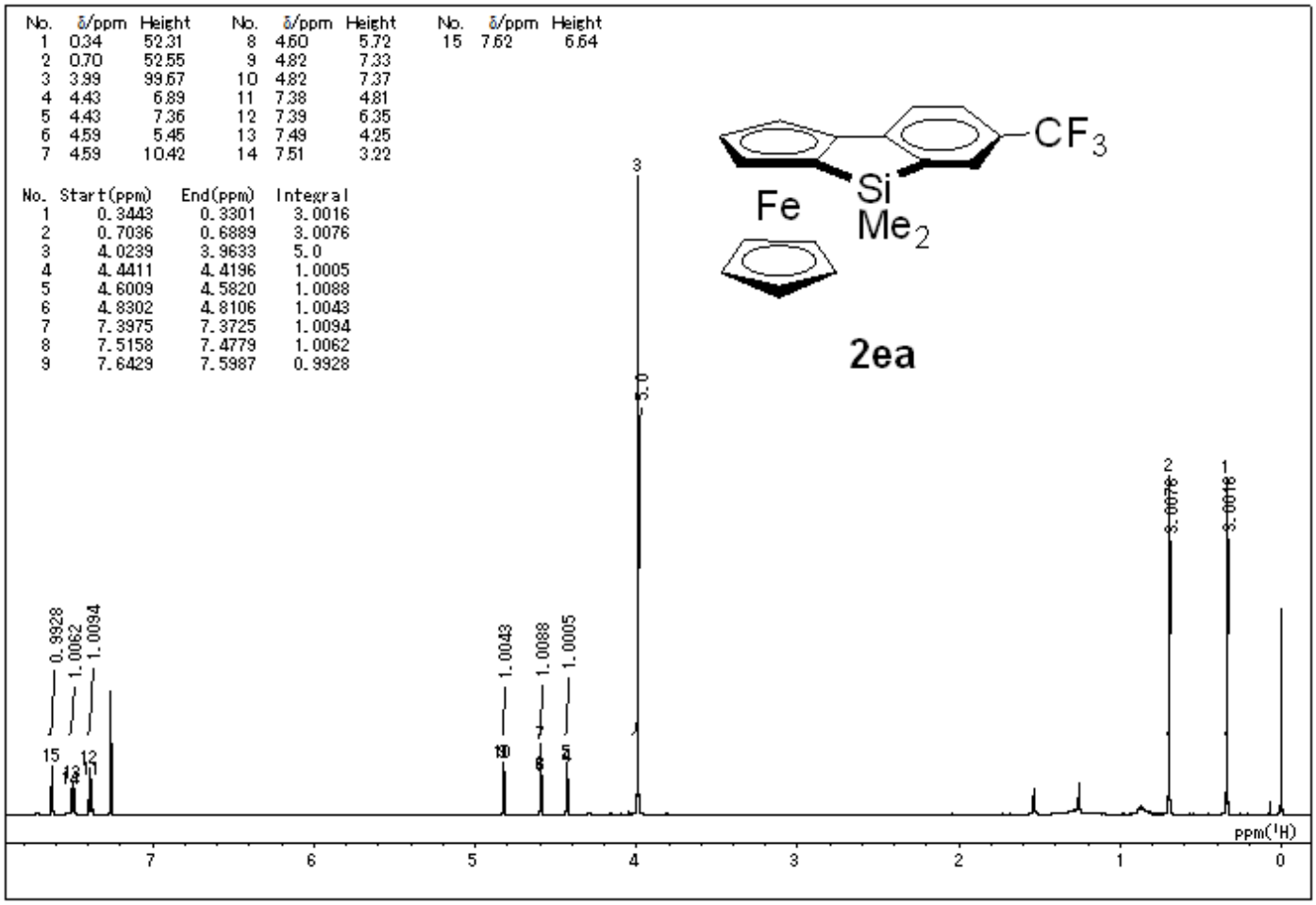
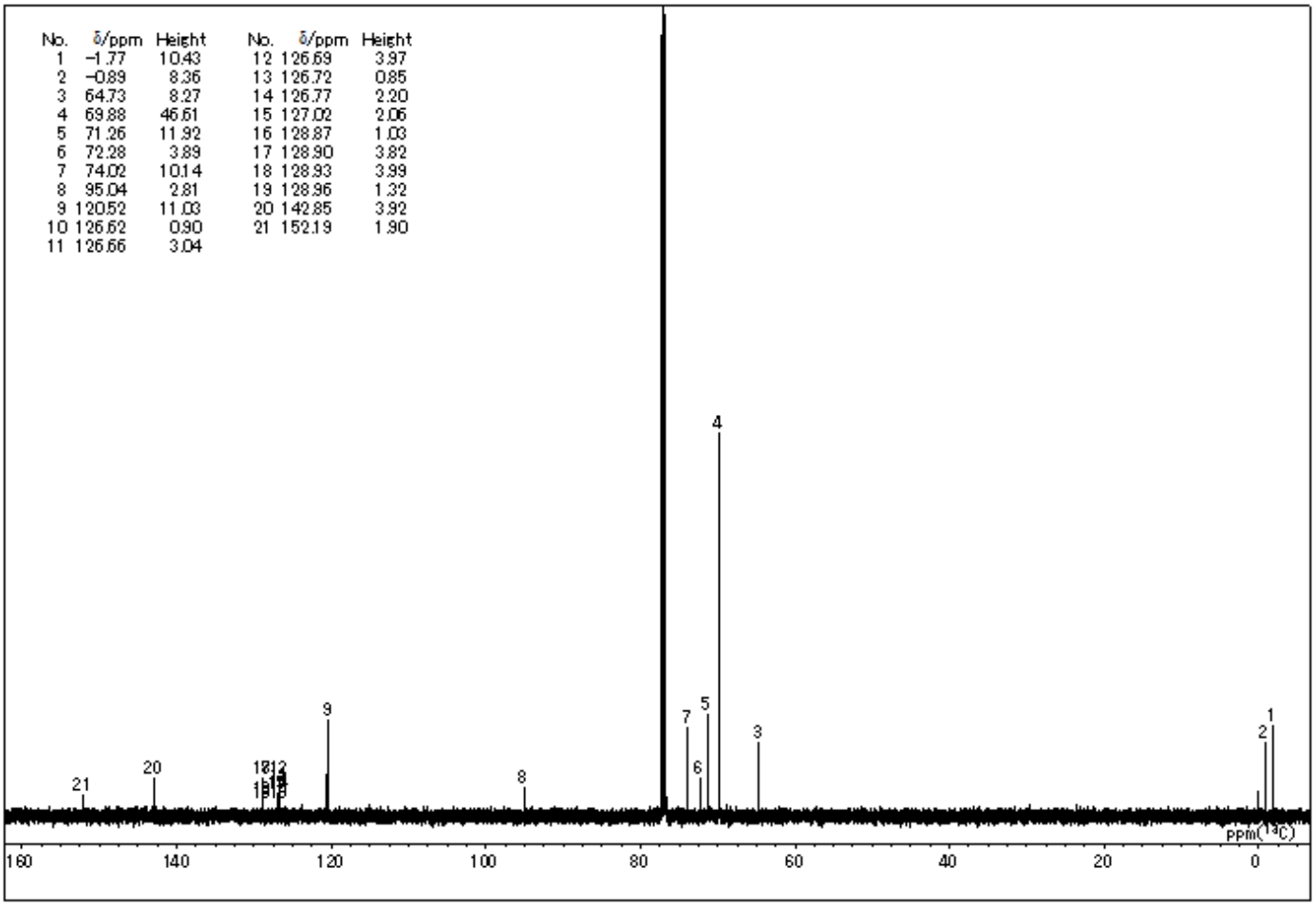


No.	δ/ppm	Height	No.	δ/ppm	Height
1	-1.55	20.10	9	72.93	15.81
2	-0.71	15.56	10	120.72	19.24
3	21.33	17.95	11	130.26	20.09
4	63.77	16.75	12	133.30	18.86
5	69.65	56.78	13	134.57	9.77
6	69.77	7.98	14	142.22	7.87
7	70.28	14.85	15	144.70	8.75
8	71.54	6.97			

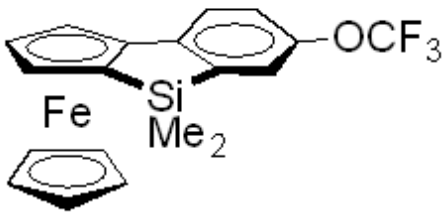



No. δ/ppm Height
1 0.34 52.31
2 0.70 52.55
3 3.99 99.67
4 4.43 6.89
5 4.43 7.36
6 4.59 5.45
7 4.59 10.42
8 4.60 5.72
9 4.82 7.33
10 4.82 7.37
11 7.38 4.81
12 7.39 6.35
13 7.49 4.25
14 7.51 3.22
15 7.62 6.64
No. Start(ppm) End(ppm) Integral
1 0.3443 0.3301 3.0016
2 0.7036 0.6889 3.0076
3 4.0239 3.9633 5.0
4 4.4411 4.4196 1.0005
5 4.6009 4.5820 1.0088
6 4.8302 4.8106 1.0043
7 7.3975 7.3725 1.0094
8 7.5158 7.4779 1.0062
9 7.6429 7.5987 0.9928
CF3
Fe
Si
Me2
2ea
ppm(1H)


No. δ/ppm Height
1 -1.77 10.43
2 -0.89 8.36
3 64.73 8.27
4 69.88 46.61
5 71.26 11.92
6 72.28 3.89
7 74.02 10.14
8 95.04 2.81
9 120.52 11.03
10 126.52 0.90
11 126.66 3.04
12 126.69 3.97
13 126.72 0.85
14 126.77 2.20
15 127.02 2.06
16 128.87 1.03
17 128.90 3.82
18 128.93 3.99
19 128.96 1.32
20 142.85 3.92
21 152.19 1.90
ppm(13C)

No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.32	50.67	8	4.54	5.55	15	7.31	7.47
2	0.68	49.82	9	4.75	7.50			
3	3.99	99.92	10	4.75	7.22			
4	4.37	7.11	11	7.08	3.02			
5	4.38	7.32	12	7.10	3.40			
6	4.53	5.71	13	7.23	5.66			
7	4.54	10.15	14	7.30	8.73			

No.	Start(ppm)	End(ppm)	Integral
1	0.3316	0.3132	3.0102
2	0.6877	0.6623	3.0131
3	4.0176	3.9508	5.0
4	4.3957	4.3493	1.0062
5	4.5531	4.5282	1.0049
6	4.7649	4.7412	1.0057
7	7.1047	7.0705	1.013
8	7.2491	7.1897	1.0333
9	7.3341	7.2769	1.0302



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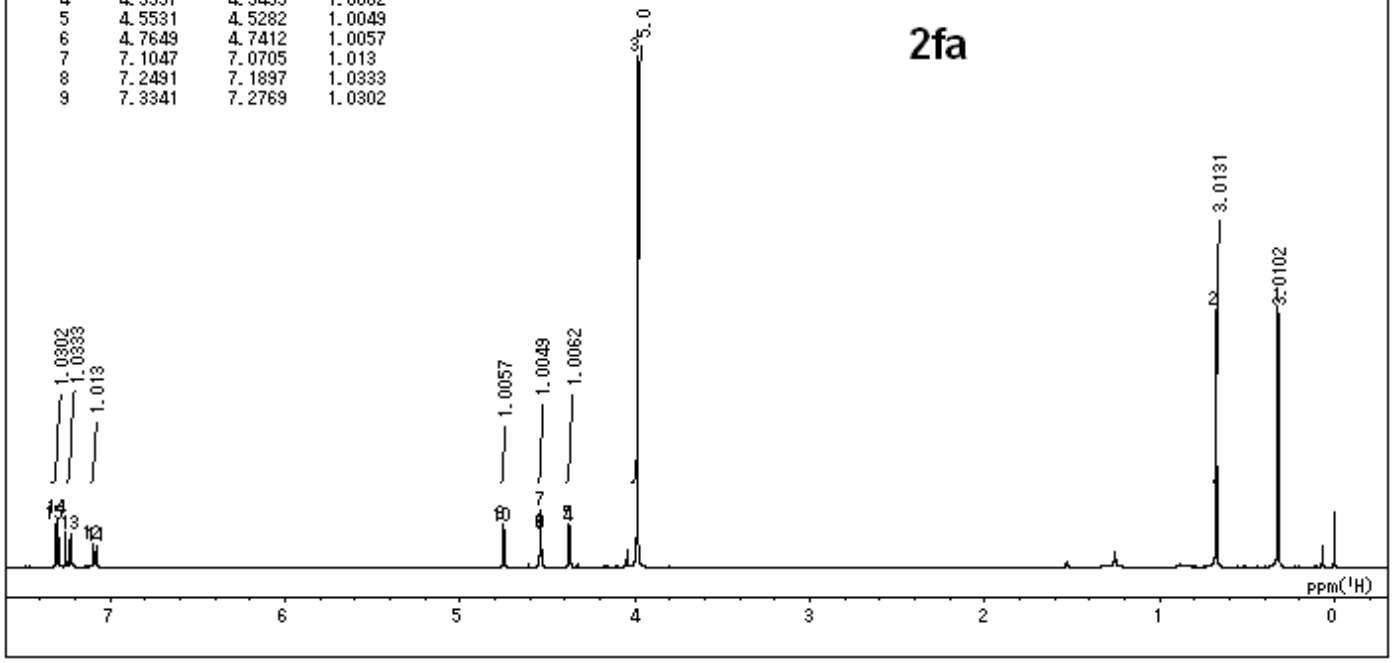
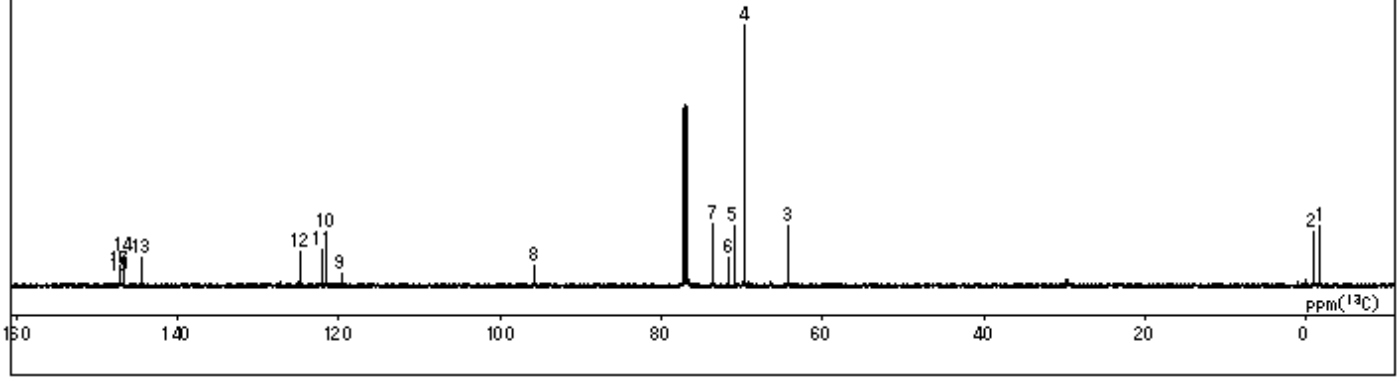
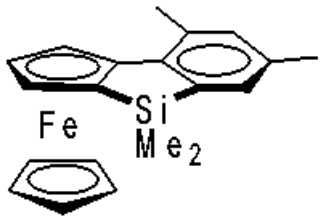


No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	-1.71	20.97	8	95.64	5.51	15	147.20	1.79
2	-0.89	18.49	9	119.53	2.60	16	147.21	3.62
3	64.23	20.40	10	121.54	18.59	17	147.23	3.96
4	69.75	97.93	11	122.16	11.17	18	147.24	1.62
5	70.85	21.02	12	124.88	10.60			
6	71.74	8.50	13	144.53	8.14			
7	73.55	21.79	14	146.58	8.82			



No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.29	49.82	8	4.50	5.78
2	0.63	50.17	9	4.51	9.62
3	2.29	41.49	10	4.51	4.95
4	2.46	41.75	11	4.79	8.46
5	3.99	97.58	12	4.79	7.94
6	4.33	8.25	13	6.90	8.87
7	4.33	8.38	14	7.09	8.86

No.	Start(ppm)	End(ppm)	Integral
1	0.3373	0.2393	3.0582
2	0.6776	0.5803	3.0404
3	2.3042	2.2366	3.0525
4	2.5092	2.4094	3.0764
5	4.0134	3.9195	5.0104
6	4.3579	4.2988	1.0027
7	4.5511	4.4727	1.0134
8	4.8381	4.7495	1.0134
9	6.9300	6.8632	1.0148
10	7.1314	7.0693	1.0



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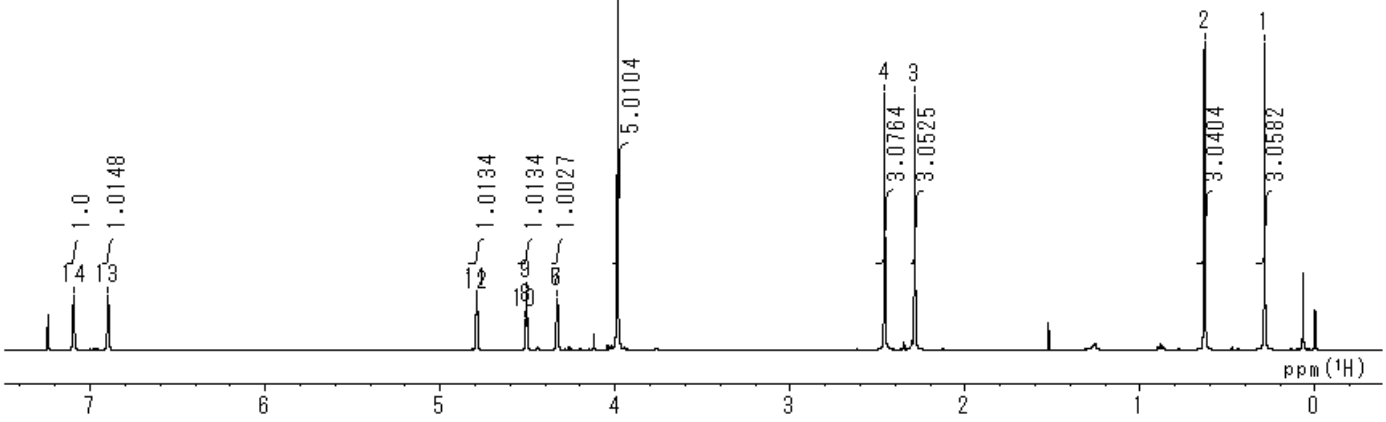
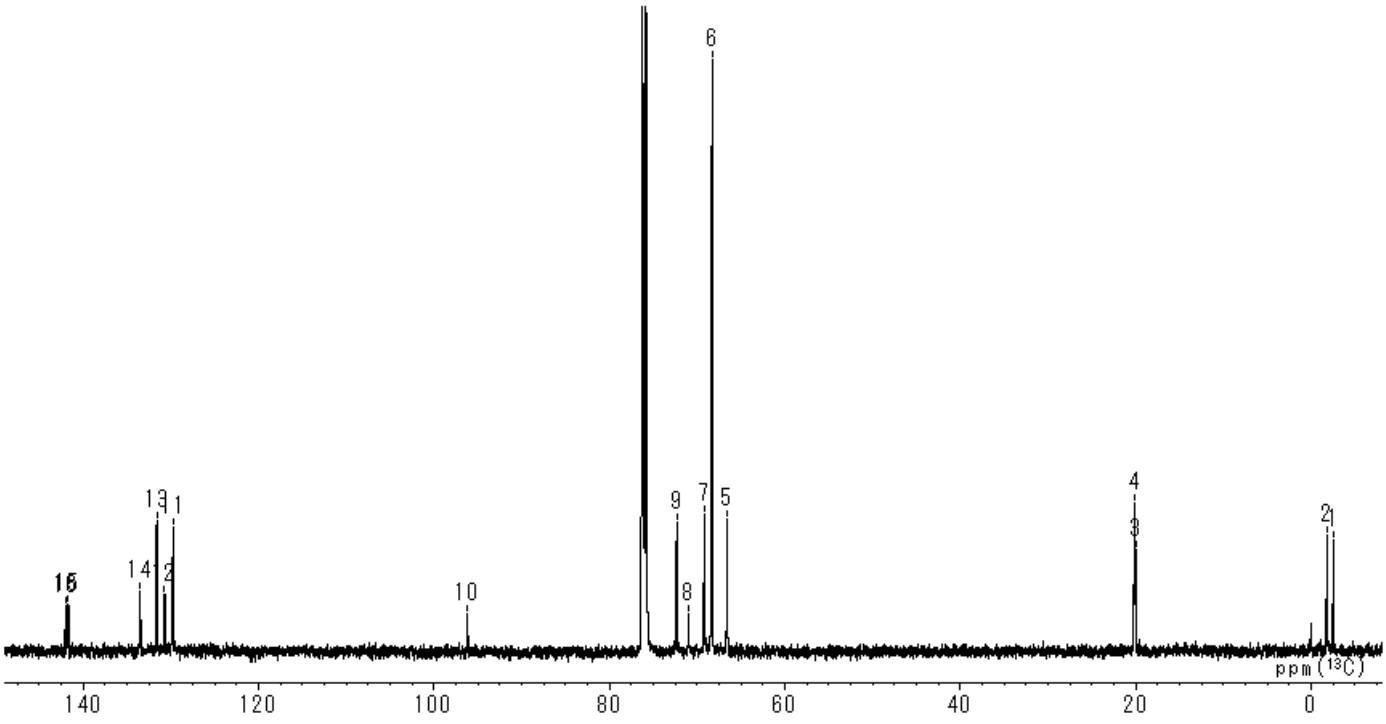


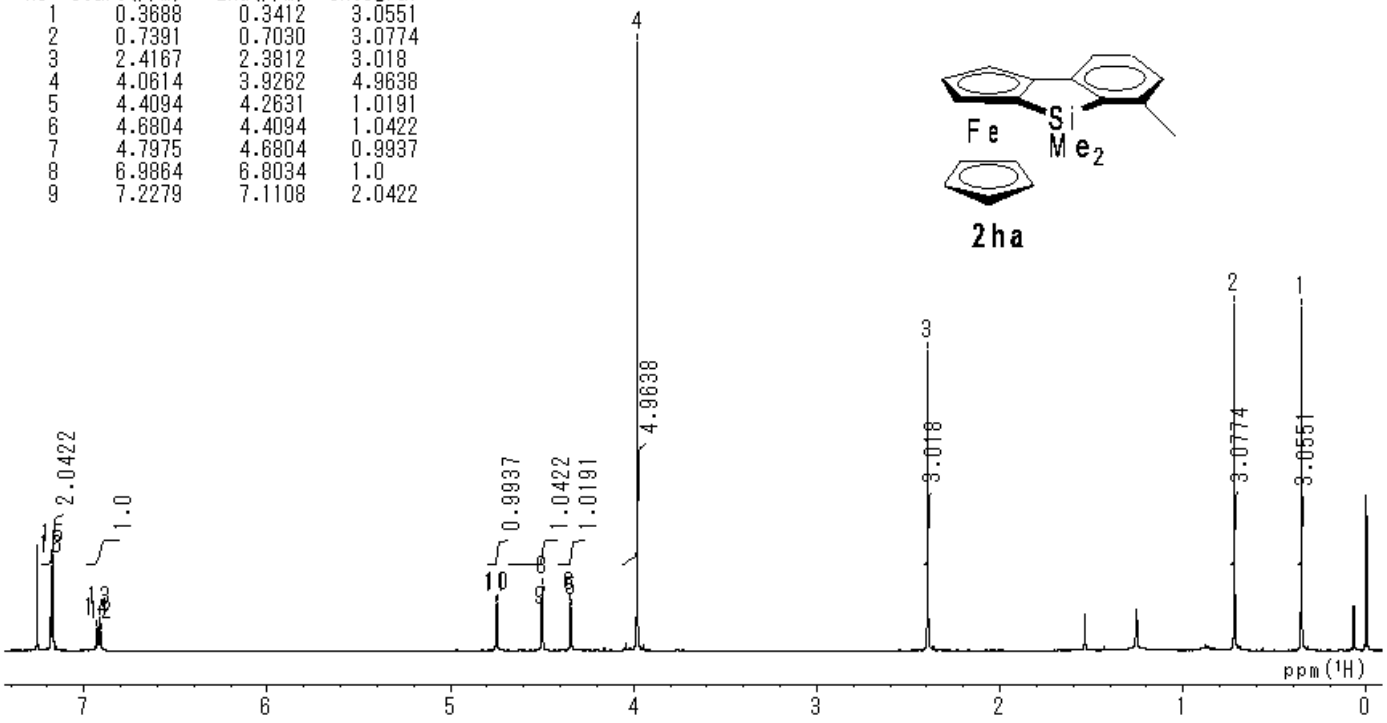
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	-2.56	14.60	8	70.95	4.74	15	141.70	6.15
2	-1.83	15.27	9	72.32	16.98	16	142.00	5.73
3	19.99	13.43	10	96.16	4.76			
4	20.13	19.58	11	129.77	16.39			
5	66.55	17.42	12	130.71	7.44			
6	68.30	79.37	13	131.62	17.24			
7	69.17	18.10	14	133.48	7.71			



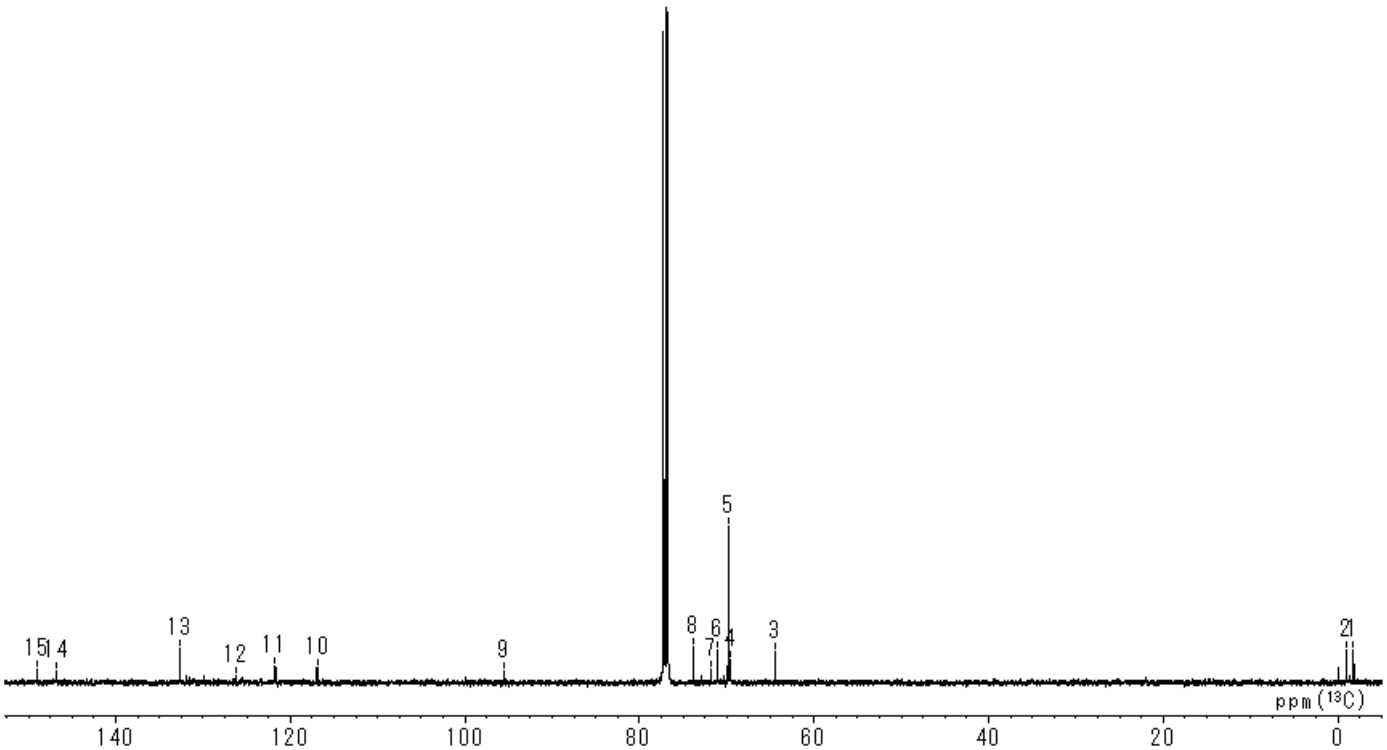
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.35	56.07	8	4.50	10.33	15	7.17	15.70
2	0.72	56.51	9	4.51	5.38	16	7.18	13.91
3	2.39	48.99	10	4.74	7.77			
4	3.98	98.99	11	4.75	7.60			
5	4.34	7.18	12	6.91	3.10			
6	4.35	7.76	13	6.92	5.49			
7	4.50	5.57	14	6.93	3.64			

No.	Start(ppm)	End(ppm)	Integral
1	0.3688	0.3412	3.0551
2	0.7391	0.7030	3.0774
3	2.4167	2.3812	3.018
4	4.0614	3.9262	4.9638
5	4.4094	4.2631	1.0191
6	4.6804	4.4094	1.0422
7	4.7975	4.6804	0.9937
8	6.9864	6.8034	1.0
9	7.2279	7.1108	2.0422

2ha



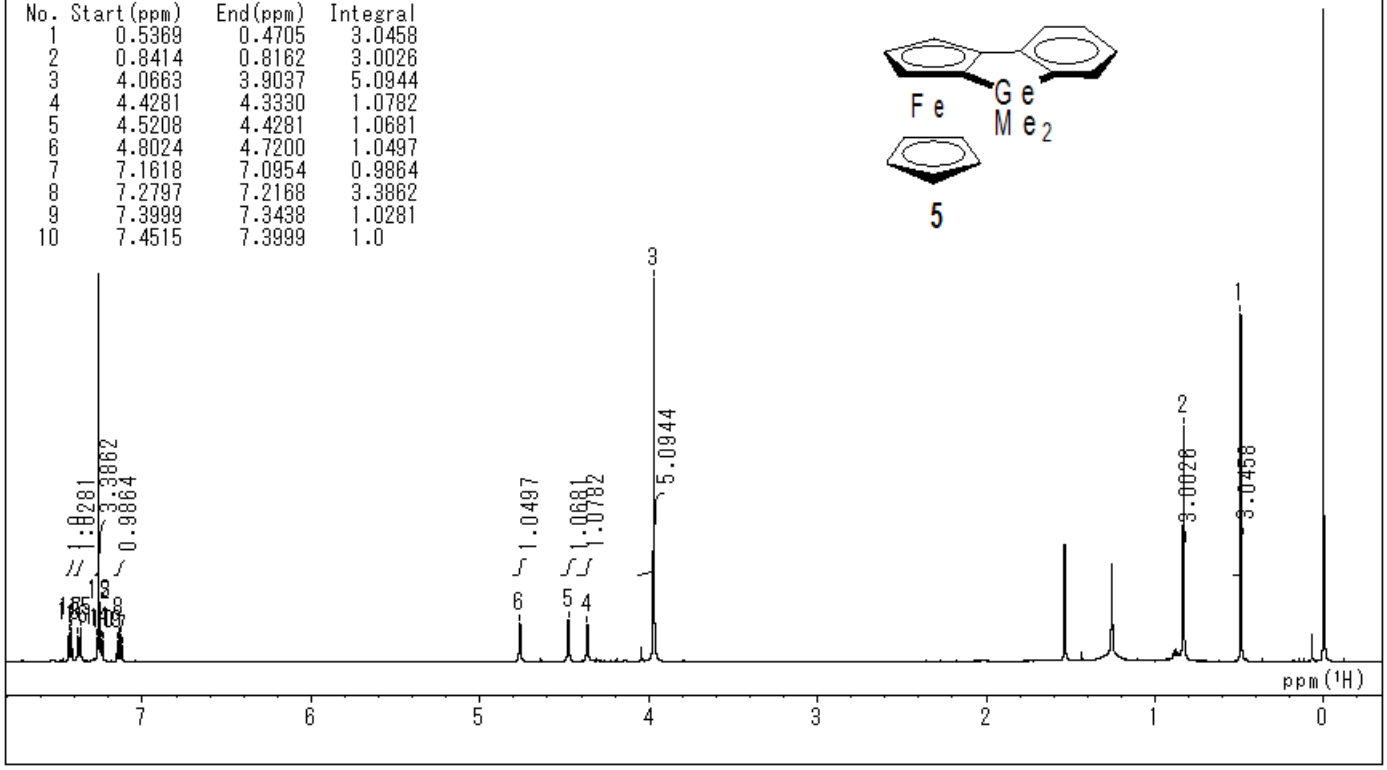
No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	-1.80	4.65	8	73.85	5.27	15	149.06	1.85
2	-0.94	4.64	9	95.45	1.59			
3	64.45	4.45	10	116.94	2.13			
4	69.63	3.23	11	121.73	2.37			
5	69.84	23.02	12	126.28	1.05			
6	71.02	4.82	13	132.61	5.05			
7	71.79	1.85	14	146.80	1.58			



No.	δ/ppm	Height	No.	δ/ppm	Height	No.	δ/ppm	Height
1	0.49	51.46	8	7.13	5.01	15	7.37	4.92
2	0.83	34.83	9	7.15	3.02	16	7.38	3.91
3	3.97	56.69	10	7.24	3.15	17	7.42	4.99
4	4.37	5.47	11	7.24	3.28	18	7.43	4.39
5	4.48	6.20	12	7.25	7.33			
6	4.76	5.71	13	7.25	7.70			
7	7.12	2.35	14	7.27	3.60			

No.	Start(ppm)	End(ppm)	Integral
1	0.5369	0.4705	3.0458
2	0.8414	0.8162	3.0026
3	4.0663	3.9037	5.0944
4	4.4281	4.3330	1.0782
5	4.5208	4.4281	1.0681
6	4.8024	4.7200	1.0497
7	7.1618	7.0954	0.9864
8	7.2797	7.2168	3.3862
9	7.3999	7.3438	1.0281
10	7.4515	7.3999	1.0

5



No.	δ/ppm	Height	No.	δ/ppm	Height
1	-1.04	8.66	8	95.70	3.13
2	-0.63	7.88	9	121.41	10.83
3	63.71	8.93	10	125.37	10.39
4	69.47	43.07	11	128.92	10.36
5	70.52	10.83	12	132.58	10.03
6	72.41	11.42	13	144.41	4.17
7	75.38	3.29	14	146.56	4.15